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SEVENTEENTH ANNUAL REPORT

OF THE

S. RECLAMATION SERVICE

1917–1918

ARTHUR P. DAVIS
Director and Chief Engineer

WILL R. KING
Chief Counsel

WASHINGTON
GOVERNMENT PRINTING OFFICE
1918

ANNUAL REPORTS OF THE RECLAMATION SERVICE.

[Reports may be purchased from Superintendent of Documents, Government Printing Office, at the prices given.]

I. June 17 to Dec. 1, 1902; 317 pages, 46 plates, 65 figures, case of drawings. Out of print.
II. Through the field season of 1903; 550 pages, 49 plates, 56 figures. Cloth, 85 cents.
III. Through the field season of 1904; 653 pages, 59 plates, case of drawings. Cloth, $1.25.
IV. Through the field season of 1905; 374 pages, 63 plates. Paper, 80 cents.
V. Fiscal year 1905–6; 312 pages, 101 plates, 2 figures. Cloth, $1.25.
VI. Fiscal year 1906–7; 287 pages. Paper, 25 cents.
VII. Fiscal year 1907–8; 219 pages. Paper, 25 cents.
VIII. Fiscal year 1908–9; 222 pages. Cloth, 40 cents; paper, 20 cents.
IX. Fiscal year 1909–10; 329 pages. (Includes history of construction to date.) Cloth, 40 cents; paper, 25 cents.
X. Fiscal year 1910–11; 290 pages. (Includes index Vols. I–X.) Cloth 40 cents; paper, 25 cents.
XI. Fiscal year 1911–12; 310 pages, map. Cloth, 40 cents; paper, 25 cents.
XII. Fiscal year 1912–13; 382 pages. Cloth, 40 cents; paper, 25 cents.
XIII. Fiscal year 1913–14; 514 pages. Cloth, 45 cents; paper, 30 cents.
XIV. Fiscal year 1914–15; 521 pages. Cloth, 45 cents; paper, 30 cents.
XV. Fiscal year 1915–16; 808 pages. Cloth, 75 cents; paper, 60 cents.
XVI. Fiscal year 1916–17; 598 pages. Cloth, 65 cents; paper, 50 cents.
XVII. Fiscal year 1917–18; 552 pages. Cloth, 70 cents; paper, 50 cents.

A price list of publications issued by the Reclamation Service can be obtained by application to the Director and Chief Engineer, United States Reclamation Service, Washington, D. C.

The monthly bulletin of the service, the "Reclamation Record," is issued about the first of each month. It contains usually 48 pages of general news and notes of interest about the projects. The subscription price to others than water users is 50 cents per year, payable in advance. The publication is free to water users.

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ANNEX A

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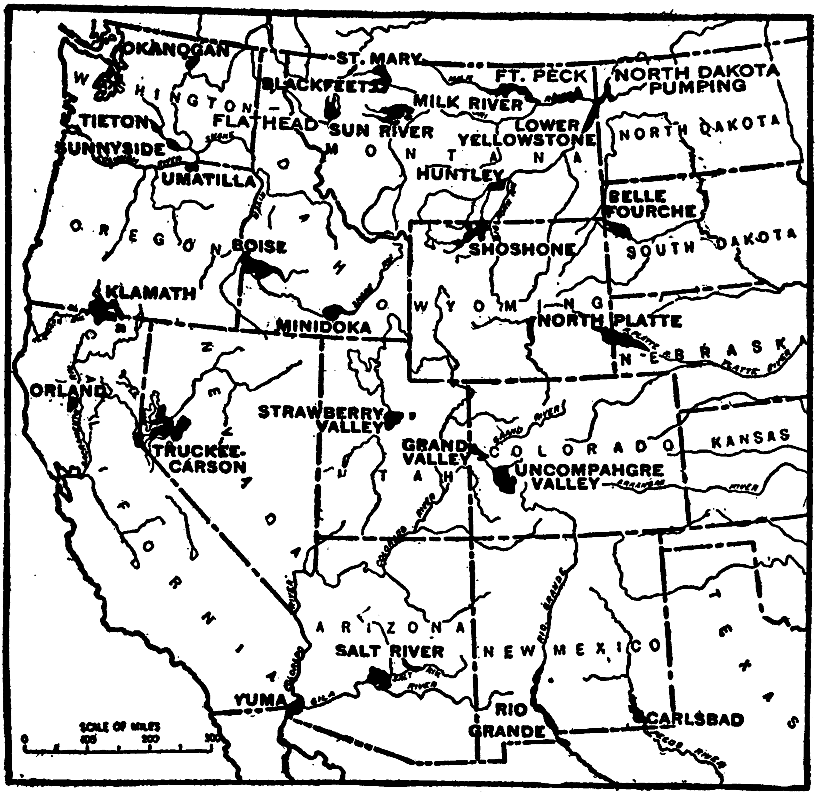

Principal irrigation projects of the U. S. Reclamation Service.

LETTERS OF TRANSMITTAL.

Department of the Interior,
Washington, December 5, 1918.

Sir: In compliance with the provisions of section 2 of the act approved June 17, 1902, entitled "An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," I have the honor to transmit the Seventeenth Annual Report of the Reclamation Service.

Respectfully,

Franklin K. Lane, *Secretary.*

The Speaker of the House of Representatives.

Department of the Interior,
United States Reclamation Service,
Washington, D. C., September 19, 1918.

Sir: Transmitted herewith is the Seventeenth Annual Report of the Reclamation Service, covering the work completed and in progress during the fiscal year ended June 30, 1918.

Very respectfully,

A. P. Davis,
Director and Chief Engineer.

The Secretary of the Interior.

SEVENTEENTH ANNUAL REPORT

OF THE

RECLAMATION SERVICE.

GENERAL DISCUSSION.

DEVELOPMENT OF RECLAMATION PROJECTS.

Including considerable tracts of land under private canals, dependent in whole or in part on the Government works for water, the total area to which the United States could deliver water during 1917 from the works built under the reclamation law was about 2,000,000 acres, of which the project statistics covered an area of approximately 1,500,000 acres. Of this slightly over 1,000,000 acres were actually irrigated. This was an increase of 50,000 acres over that irrigated in the season of 1916. The entrance of the United States into the European war in the spring of 1917 presented a situation necessitating an increase in the production of food by every feasible method, but the season was already well advanced and all that could be done under the circumstances is represented by the above figures.

The efforts to increase the production were continued during 1918, and where cultivation could not otherwise be secured some of the uncultivated public lands were leased temporarily to those who would cultivate. This materially increased the production on the projects by utilizing land that would otherwise be vacant and by placing these lands in the hands of men who were generally stronger financially than the average settler and able to secure a greater return the first year.

Incidentally the experience in this line has proved this policy to be very beneficial. The leasing method brings the land into cultivation under terms by which it is cleared, leveled, supplied with farm ditches, broken up, and cultivated so that the sod is well rotted and the land reduced to a better state of tillage, and the chances of success on the part of the future settler thereby greatly increased. Experience has demonstrated that it would be a wise policy to continue this practice of preparing the lands for the incoming settler irrespective of war requirements. By leasing the land for two or three years this service is secured without cost to the United States and with great benefit, not only to the settler but to the Government, in better security for the repayment of construction charges by the settler. This policy is being gradually and carefully extended where it can be done without interfering with the natural course of settlement on the projects, always keeping in mind the interests and requirements of the actual settler, whose welfare and prosperity are the first concern of the law and its administration.

PRINCIPAL OPERATIONS ON THE PROJECTS.

The principal work of the Reclamation Service during the past year has been the operation of the various projects which have been constructed or partly constructed by the service. Next in importance have been the continuation and extension of drainage work where required to prevent injury of reclaimed land and to lower the ground water where this has become injurious. In addition, numerous minor extensions of projects have been constructed, bringing under irrigation increased acreages where these could be made productive in the immediate future.

The general policy has been not to undertake new projects or any large extensions of existing projects unless it would be possible thereby to bring about increased production of food and forage in the immediate future. This policy has been prompted by the necessity of conserving the labor and materials of the country for essential industries and those contributing to the winning of the war.

In accordance with this policy, the work of constructing a reservoir on the Tieton River in the State of Washington, which was started before the United States entered the war, was recently discontinued. Experience had shown the impossibility of keeping the labor forces anywhere near the economical point and the organization was accordingly disbanded and the work brought to a close to be resumed after the end of the war.

The only new project undertaken recently is the King Hill project in southern Idaho, where private capital had constructed an irrigation system but was unable to complete it. The constructed works, built largely of wood, were rapidly falling into decay and the community settled under the project was threatened with ruin by the failure of their water supply. The original investors lost their entire investment and the State purchased the works under foreclosure. These were turned over without cost to the United States and the process of reconstruction and completion was started in 1918 and is now in progress. The old work has failed at several points and it is probable that if the United States had not stepped into the breach the water supply would now be cut off and the crops destroyed. Important repairs have been made and the work of reconstruction is well under way.

The Salt River project, Arizona, has been turned over to the water users' association to operate, and the association has by contract been granted the income of the power plants constructed in connection with the project. It is in a very prosperous condition. Its construction is completed and its connection with the Government is confined to occasional inspection and supervision and the collection of construction charges.

On the Yuma project, Arizona-California, the construction work has been confined to small extensions of the lateral system, drainage work, and river front protection. The project is in the most prosperous condition it has ever been, the average gross yield of cultivated lands being over $100 per acre and many of those best handled running far above this figure. Public notice announcing construction charges was issued in 1917 and first payments fell due on December 1 of that year. Most of these have been paid, part of them under protest. The water users' association is contesting the payment of construction charges in the courts, but the case has not yet been brought to trial. Preparations are being made for constructing the Yuma Mesa pumping project which will be irrigated with water pumped from the main canal south of the city of Yuma. Negotiations are also pending with the Imperial Irrigation District to connect its system with Laguna Dam and provide better security for its water supply.

The Orland project in California has been practically completed and forms the first unit of a larger Sacramento Valley project. Public notice on the Orland project was issued in 1916 and the first payments were made on the first day of December of that year and in one check by the association paying all of the accrued charges and assuming all risk of delinquency on the part of its shareholders. The project is prosperous and constantly growing in development. The only construction work remaining is a small amount of canal lining which was provided for in the funds covered by the current public notice.

The Grand Valley project in Colorado has been so far completed that water was delivered on a rental basis to portions of the land in 1917 and to a larger portion in 1918. About 5,000 acres have been opened to entry and occupied by settlers. Some extensions of laterals and betterment work on the new canals and laterals are under way. The agricultural operations are gradually extending and the results encouraging.

A contract has been concluded with the water users' association of the Umcompahgre project, Colorado, by which the United States will operate the project for a period of five years on the payment of the cost thereof by the water users' association. At the end of this period the project is to be opened under public notice, unless the period is further extended by the Secretary of the Interior. The construction of the project is practically completed, and only a few minor betterments are being made. The cultivation of the lands is gradually extending, and slow improvement is being made in the use of water, which is very wastefully applied to the lands. Efforts are being made to introduce the rotation system and to apply other methods of securing the best use of the water supply and thus reduce the growing menace of a rising water table and destruction of fertility of the land by excessive application of water. Agriculture is successful and the settlers are generally prosperous.

On the Boise project in Idaho, the Arrowrock and Deerflat Reservoirs have been completed and the canal system covers the main body of the project. Contemplated extensions will be gradually made to conform to better practices regarding the use of the water, which is sufficient for irrigating about 40,000 additional acres of land if used with reasonable economy. Public notice was issued in 1917, announcing the charges on the completed portion of the project and fixing December 1, 1918, as the due date of the first payment. This payment has been made by most of the water users, but some have filed protest and the water users' association is contesting these payments in the courts. The case has not yet come to trial.

In addition to the lands for which the United States has constructed irrigation canals, storage water to supplement the previous supply has been sold to the lands under the New York Canal and the Pioneer, Nampa and Meridian, and Riverside districts. Storage water was also furnished under special contract to the Farmers

Union Canal. Agriculture is successful and the settlers are generally prosperous.

The Minidoka project in Idaho, as originally planned, is completed, but several extensions are possible and desirable. Public notices are in effect upon the lands now served with irrigation water and the gravity lands of the project have formed an irrigation district which operates the canal system under contract with the United States. The pumping unit on the south side is operated by the United States. Agriculture is successful, the settlers are generally prosperous, and payments are being promptly made.

The Huntley project in Montana is practically completed and continues to hold its reputation of being one of the most successful and thickly settled projects of the service. Drainage work is being continued and has so far been successful in relieving the lands for which constructed. Construction payments are being regularly made.

In the Milk River Valley, Montana, water is being delivered from the St. Mary River to a canal constructed by the service diverting the St. Mary River just below St. Mary Lakes. This water is being used on a rental basis. Less than one-fourth of the available land is being irrigated.

On the Sun River project, Montana, the completion and seasoning of the canal and lateral system for 25,000 acres on the North Side are nearly completed, and it is expected that water will be delivered to this tract in 1919. Dry farming has been practiced extensively in this region and the entrymen have protested vigorously against the irrigation system, although they entered their lands subject to payment therefor. There have now been two very dry seasons with accompanying crop failures on the dry lands, and it is believed that irrigation water will be better appreciated in the future. This project is a favorable location for a sugar factory.

The Lower Yellowstone project, Montana-North Dakota, is being operated on a rental basis and less than one-fourth of the lands for which water is available are being irrigated. Steps have been taken to form an irrigation district and arrange for permanent water rights for the lands to be included. A law adapted to such organization of districts was passed by the last legislature of Montana. This project is also a favorable location for a sugar factory.

The North Platte project in Nebraska and Wyoming continues to be one of the most successful of the reclamation projects. The interstate unit on the north side of the river has been opened under public notice, and is making payments regularly. Cultivation and improvement are steadily extending. Drainage is being constructed to relieve some localities where the water table is high, and considerable areas have already been relieved. The drainage problem, however, is neither extensive nor serious. The Fort Laramie Canal, on the south side of the river, is under construction, and water is being delivered to small tracts under rental order. It is expected that fifteen or twenty thousand acres will receive water service from the Fort Laramie Canal in 1919, and progressively more from year to year.

The Truckee-Carson project in Nevada is slowly extending its cultivated area, but on a considerable portion of the project the water table is high and drainage is needed. A local association in the neighborhood of Fernley has organized and entered into obligation to pay for drainage, and the drainage works necessary in that region have been practically completed with successful results. The necessary organization on the south side of Carson River to secure drainage work has not been formed. Slow progress is being made in the settlement of the rights to the use of Lake Tahoe and the storage reservoir, and pending this settlement no further development is feasible.

The Carlsbad project in New Mexico is gradually increasing its cultivated area as the progress of drainage works continues and waterlogged conditions improve. Serious damage was done to the storage reservoir by a great storm in March, 1915; this has, however, been repaired and a new spillway constructed. Two subsequent years, 1917 and 1918, have been abnormally dry and the project has been perilously near water shortage throughout those seasons. No serious reduction of crop yields has occurred and a sparing application of water has resulted in some benefit from the lowering of the water table.

The Rio Grande project, in New Mexico and Texas, is one of the localities of largest operations under the Reclamation Service. Water is being delivered to nearly one-fifth of the lands from the storage reservoir at Elephant Butte. The work is being pushed on construction of the canal system and on the general drainage system of the valley. Much of the land for which water is available is waterlogged and a rising water table threatens other areas. The most urgent work on this project is the completion of the drainage system and the reconstruction of the lateral system by which water can be used more efficiently and economically and the rise of the ground water arrested.

The North Dakota pumping project has not been operated for several years, owing to the failure of the lands benefited to make payment therefor. Two successive dry seasons have demonstrated the necessity of irrigation and the landowners have taken steps to organize an irrigation district and secure the operation of the canal system. It is believed that this organization will be successfully accomplished.

The Umatilla project in Oregon has undergone rapid development in the last year, owing to the completion of the western extension and delivery of water therefrom. The lands cultivated under this extension are showing excellent results and development is expected to continue. Much trouble has been experienced by sand drifting into the canals, but this is being gradually overcome. Urgent requests are being made for the Government to take over the system of the Western Irrigation Co., which receives water from the same river and might by some additional construction receive storage water from the Government reservoir.

The Klamath project in Oregon and California is being extended gradually as the waters of Tule Lake recede. Drainage works are also being constructed to counteract the rising water table. Arrangements have been made with the owners of land around Lower Tule Lake for the reclamation of those lands under legislation now pending in Congress to include the public lands affected. This legislation is a necessary prerequisite to this development.

The Belle Fourche project in South Dakota is being extended gradually to cover more land and the lands already under cultivation are yielding satisfactory results. This project is a favorable location for a sugar factory. Some of the lands on the Belle Fourche project need drainage, but arrangements have not yet been made for the repayment of the cost and the plans are suspended awaiting such arrangements.

On the Strawberry Valley project in Utah the new system constructed by the Government is being operated by the irrigators under special contract and payments of construction charges are being regularly made. There are still some sales of rights in the Strawberry Reservoir to be made in order to return the entire cost of the project. Investigations for extensions and the use of water upon other lands are in progress.

The extremely dry years of 1917 and 1918 throughout most of the West have broken all records in this respect and thousands of head of livestock and many private irrigation projects have suffered for lack of water. The Reclamation Service has experienced serious shortage on only one project, namely, the Okanogan project in northern Washington. The records of water supply for this project for 15 years prior to 1918 show a mean annual yield of 30,500 acre-feet and a minimum yield of 17,000 acre-feet. The yield for 1918 was less than 10,000 acre-feet, a large portion of which was necessarily applied to lands holding old vested water rights. An emergency appropriation of $125,000 was made by Congress in July, 1918, but little could be accomplished to relieve the water shortage. Pumping plants were installed at Salmon Lake and at Duck Lake, which to a limited extent relieved the shortage on some of the lands; but there will be considerable loss upon a portion of the area where the open sandy soil and subsoil have caused an acute condition and the abandonment of some of the farms.

The Sunnyside unit of the Yakima project, Washington, has been extended at the lower end, which is gradually coming under cultivation. The project as a whole is very productive and prosperous. Strong representations are being made to enlarge the main canal and extend it by means of pressure pipe across Yakima River to cover lands known as Kennewick high lands, now under pumping plants built by private capital. The system covering these lands is built largely of wood, which is in an advanced stage of decay and is in imminent danger of failure. The power supply is also unreliable and the service is being strongly urged to extend the Sunnyside system, which can cover this land by gravity. The land is largely in bearing orchards and failure of the water supply would be very disastrous.

The Tieton unit of the Yakima project is rapidly expanding and being devoted to general farming, contrary to first expectation. Although it is an excellent fruit country the practice is growing of planting legumes between fruit trees in order to produce additional revenue and to build up the fertility of the land. This use has resulted in the requirement of a greater quantity of water than was originally planned and it has accordingly been necessary to eliminate some of the uncultivated lands and to increase the capacity of the main canal. All charges have been assumed by the irrigation district organized on this unit and payments are being made regularly and promptly under public notice. The Yakima project as a whole is one of the foremost in general prosperity and in returning the cost of its construction.

The Shoshone project in Wyoming is being gradually enlarged by extension of canals on the north side of Shoshone River. The drainage system is also being extended under contract with the water users to repay the cost in accordance with law. The project is very prosperous and payments are being made regularly under public notice.

SUMMARY OF CONSTRUCTION RESULTS.

The following table gives in concise form many of the items which have been accomplished. It will be noted that in spite of labor and other conditions due to the war the total excavation for the year is nearly as great as last year, being about 9,000,000 cubic yards, and that nearly 600 miles of canals and drains have been constructed.

Summary of construction results, June 30, 1918.

Items.	To June 30, 1918.		To June 30, 1917.		Increase.	
LANDS.						
Estimated area of projects on completion	*Acres.* 3,081,480	*Farms.* 62,477	*Acres.* 3,072,795	*Farms.* 62,451	*Acres.* 8,685	*Farms.* 26
Reservoir capacity available (original)	*Acre-feet.* 9,197,460		*Acre-feet.* 9,193,800		*Acre-feet.* 3,660	
CANALS, DITCHES, AND DRAINS.	*Miles.*		*Miles.*		*Miles.*	
Canals over 800 second-feet capacity	420		401		19	
Canals 301 to 800 second-feet capacity	667		665		2	
Canals 50 to 300 second-feet capacity	1,807		1,678		129	
Canals less than 50 second-feet capacity	7,544		7,226		318	
Total canals	10,438		9,970		468	
Waste-water ditches	495		456		39	
Drains, open	643		575		68	
Drains, closed	163		149		14	
Total	1,301		1,180		121	
Grand total	11,739		11,150		589	
TUNNELS.						
Number	94		94		0	
Length ... feet	142,237		141,987		250	
STORAGE AND DIVERSION DAMS.	*Cubic yards.*		*Cubic yards.*		*Cubic yards.*	
Masonry	2,084,187		2,083,376		811	
Earth	9,998,351		9,818,103		180,248	
Rock fill and crib	1,185,529		1,155,763		29,766	
Total	13,268,067		13,057,242		210,825	
DIKES AND LEVEES.						
Length and volume	*Feet.* 504,426	*Cubic yards.* 4,470,702	*Feet.* 499,180	*Cubic yards.* 4,430,190	*Feet.* 5,246	*Cubic yards.* 40,512
	Concrete.	Wood.	Concrete.	Wood.	Concrete.	Wood.
CANAL STRUCTURES.						
Costing over $2,000	958	184	902	134	56	50
Costing $500 to $2,000	2,011	478	1,866	430	145	48
Costing $100 to $500	9,177	5,011	7,946	4,794	1,231	217
Costing less than $100	16,386	55,003	13,754	51,617	2,632	3,386
Total	28,532	60,676	24,468	56,975	4,064	3,701
Grand total	89,208		81,443		7,765	

Summary of construction results, June 30, 1918—Continued.

Items.	To June 30, 1918.		To June 30, 1917.		Increase.	
	Number.	Length.	Number.	Length.	Number.	Length.
BRIDGES.		*Feet.*		*Feet.*		*Feet.*
Steel	106	8,466	104	7,002	2	1,464
Combination	414	12,542	412	11,924	2	618
Wood	5,500	117,606	4,966	108,226	534	9,380
Concrete	342	4,254	335	4,174	7	80
Total	6,362	142,868	5,817	131,326	545	11,542
CULVERTS.						
Concrete	1,832	88,719	1,654	80,371	178	8,348
Metal	1,433	52,005	1,346	48,977	87	3,028
Terra cotta	1,096	50,947	920	44,339	176	6,608
Wood	3,164	72,213	3,068	69,346	96	2,867
Total	7,525	263,884	6,988	243,033	537	20,851
PIPE.		*Linear feet.*		*Linear feet.*		*Linear feet.*
Concrete		596,250		556,918		39,332
Metal		239,616		239,400		216
Terra Cotta (tile)		1,166,337		1,046,770		119,567
Wood		471,236		331,380		139,856
	Number.	Length.	Number.	Length.	Number.	Length.
FLUMES.		*Feet.*		*Feet.*		*Feet.*
Concrete	80	20,427	76	14,870	4	5,557
Metal	755	150,799	674	142,084	81	8,715
Wood	1,928	433,947	1,679	362,134	249	71,813
Total	2,763	605,173	2,429	519,088	334	86,085
	Concrete.	Wood.	Concrete.	Wood.	Concrete.	Wood.
CANALS LINED.						
Length ... miles	307.30	4.10	296.90	4.10	10.4	....
Total	311.40		301.00		10.4	
BUILDINGS.		*Number.*		*Number.*		*Number.*
Offices		83		79		4
Residences		590		566		24
Power plants		26		26		....
Pumping stations		69		67		2
Barns, storehouses, etc		495		446		49
Total		1,263		1,184		79
	Number.	Depth.	Number.	Depth.	Number.	Depth.
WELLS.		*Feet.*		*Feet.*		*Feet.*
Number and depth	416	35,411	391	34,583	25	828
COMMUNICATIONS.		*Miles.*		*Miles.*		*Miles.*
Roads		955		902		53
Railroads		83		83		....
Telephones		2,934		2,822		112
Transmission lines		450		442		8
POWER DEVELOPED.						
Water and steam ... horsepower		48,093		47,361		732
EXCAVATION.		*Cubic yards.*		*Cubic yards.*		*Cubic yards.*
Class 1, earth		141,015,518		133,043,727		7,971,791
Class 2, indurated material		9,569,457		8,882,812		686,645
Class 3, rock		8,199,793		7,859,995		339,798
Total		158,784,768		149,786,534		8,998,234
RIPRAP ... cubic yards		1,735,893		1,527,920		207,973
PAVING ... square yards		807,485		749,395		58,090
CONCRETE ... cubic yards		2,976,448		2,942,775		33,673
CEMENT ... barrels		2,919,107		2,841,763		77,344

REPAYMENTS.

The projects now making payments under public notice are:

Arizona, Salt River project.
Arizona-California, Yuma project.
California, Orland project.
Idaho, Boise project.
Idaho, Minidoka project.
Montana, Huntley project.
Montana, Sun River.
Montana-North Dakota, Lower Yellowstone.
Nebraska-Wyoming, North Platte project.
Nevada, Truckee-Carson project.
New Mexico, Carlsbad project.
North Dakota, North Dakota Pumping.
Oregon, Umatilla project.
Oregon-California, Klamath project.
South Dakota, Belle Fourche project.
Utah, Strawberry Valley project.
Washington, Okanogan project.
Washington, Yakima project.
Wyoming, Shoshone project.

Repayments of construction charges are increasing gradually, and for the fiscal year 1918 reached the sum of $1,353,144.64.

OPERATION AND MAINTENANCE.

The Reclamation Service has operated all of the projects under its charge except the Salt River project and the gravity unit of the Minidoka project, which, as above stated, have been turned over to the water users for operation and maintenance. Considerable progress has been made in the matter of cooperation with the water users and friendly cooperative relations now obtain where antagonism formerly existed on several of the projects. Benefit has been derived by the irrigators from the dissemination of knowledge of better methods of farming and irrigation, and in spite of unfavorable physical conditions the projects, as a whole, are prosperous and remunerative and are contributing largely to the wealth and especially to the subsistence of the country. The crop values on Government projects for the season of 1917 reached nearly $60,000,000 without taking account of the live-stock industries, including meat, dairy products, wool, etc, nor of either crops or livestock products or substantial areas several from the Government works, but not covered by crop census. Besides this is the indirect or incidental benefit to the mining and livestock industries resulting from the production of large quantities of food and forage in the localities where needed and the increase in the number of independent homes in the arid region.

It is necessary for the Reclamation Service to exert by such methods as may be possible a pressure toward the achievement of greater economy in the use of water than has obtained in the past. A few of the projects have achieved creditable results in this respect, while upon others much remains to be done to terminate wasteful use of water and correct the injury that this has produced.

An excess of water used in irrigation is not only a waste of a costly and precious liquid, which should be used in extending agricultural production, but it is actually harmful to the lands to which applied by leaching plant food from the soil, raising the water table, and causing injurious swamp or water-logged conditions in their vicinity.

The methods employed to enforce and encourage a more rational use of water are three:

1. Dissemination of knowledge of the reasons why excess of irrigation water is injurious and the methods adapted to conserve water in the soil and to handle it with greater economy.
2. Adjustment of charges for irrigation water as required by the reclamation extension act, by which the irrigator must pay for the use of excessive quantities of water.
3. The introduction of the rotation system by which water is delivered in larger heads in order that it may be more economically used and careful measurement of water to each user.

SETTLEMENT.

The settlement section under the jurisdiction of the statistician has charge of publicity, photography, and the dissemination of information concerning the home-making opportunities of the service.

Publicity is obtained through the medium of the daily and weekly press, special stories for syndicate and magazine writers and others, lectures illustrated by stereopticon and motion pictures, the loaning of illustrated lectures, and by attractive exhibits at fairs, expositions, etc.

During the fiscal year the use of the newspapers and magazines decreased, for the reason that the work of construction having been gradually slowed up the area of public lands available for settlers correspondingly was reduced. War has resulted in fewer calls for lectures and material for special stories. Notwithstanding these facts there has been but slight falling off in the number of inquiries from home seekers, and the correspondence in the Washington office continued heavy throughout the year.

During the fiscal year the settlement section had charge of three important land openings, namely, on the Shoshone project, September, 1917; on the Grand Valley project, March, 1918; and on the Uncompahgre project, April, 1918. Announcement of these openings brought a flood of inquiries to the Chicago and Washington offices. In a single day more than 1,200 people visited the former office. During a period of three days the temporary office in Kansas City was visited by more than 500 home seekers daily. The lands opened to entry were unclassified, and on each project varied widely in quality and value. Naturally the home seekers made choice of the best, and there was no difference in the water-right charges. This resulted in as high as 50 to 60 applications for the choicest units, while numerous of the poorer and less attractive units were without an applicant. At each opening the number of home seekers in attendance greatly exceeded the total number of the farms, and if the latter had been of equal value all would have been filed on. The injustice of taxing the poorest land on a project the same construction charge that is placed on the best will always retard the settlement of the former. The proof of this is found in the fact that of the 295 farm units open to entry to-day on all of the projects not one can be classed as choice. Most of the remaining units are rough, seeped, and cut by canals or otherwise unattractive and far more expensive to develop. For one or more of the reasons mentioned these units are vacant to-day and in numerous cases are an eyesore or a breeding place for grasshoppers and rabbits. On projects like the Minidoka and North Platte such units are gradually being acquired by sons or relatives of farmers residing nearby or by employes of the Government. On the Minidoka project a large number of units of this kind were taken up during the past 12 months. To-day less than 200 acres remain unentered on this project.

In view of the extraordinary favor which the public and our national lawmakers have accorded the plans of the Secretary to provide employment and homes on reclaimed areas for our returning soldiers, it is well to emphasize the fact that notwithstanding the war crisis there is no lessening in the demand for public lands as soon as they are made available by homeseekers who are not at the front. Some provision must be made to satisfy this demand at the same time that the Nation is providing for its soldiers. The follow-up system employed by the settlement section to ascertain the financial condition and experience of the homeseekers indicates that a far better class is to-day seeking lands under Government control than ever before. They are more practical and experienced, and as a rule have a greater capital to invest, all of which presages a larger measure of success. With the jump in prices of all farm products, lands on the projects generally have greatly increased in value. It is no longer surprising to find lands but three years from desert selling for $100 and $200 per acre, the buyer in addition having to pay a water right charge ranging from $40 to $80 per acre.

Briefly summing up the settlement work it may be said that the demand for Government lands of good quality far exceeds the supply, and the present settlement organization with little difficulty could readily find settlers for 200,000 acres a year. The untilled lands on the projects offering the greatest difficulty in the way of settlement are those in private ownership. The problem of securing homeseekers for these can not be solved successfully until the present owners prepare these lands for crops and make the prices and terms of sale more attractive. Exploitation of the settler, while much less prevalent than before, still obtains on some of the projects and is a serious factor in retarding development. With the high prices of farm crops the percentage of tenant farmers shows an increase. Many of our landowners have leased their lands and have moved into town. This condition warrants careful consideration of all who are concerned in perpetuating the back-to-the-land movement because it subverts the basic principle upon which the Reclamation Act was founded. The evils of tenantry are too well understood to require discussion.

During the past year the settlement section has had the heartiest cooperation of the project and civic associations, of the State lands boards, and other officials. This cooperation has enabled the service to secure a very large quantity of valuable motion film, photographs, and other publicity material. Much of this film has been made available for public use, and a large amount is now being used by the Committee on Public Information in connection with its educational campaign abroad.

In June the settlement office was closed for the term of the war.

IRRIGATION AND CROP RESULTS, 1917.

The works built under the reclamation law are now serving probably 2,000,000 acres under irrigation. The exact acreage is not known to the Reclamation Service because considerable areas not covered by its census are under canals built by private parties and are related to the Government projects only through contracts under the Warren Act, by which they share in various degrees the benefits of the Government works. In most of these cases the storage works are used in common; occasionally the diversion works and main carriage canals and part of the water stored or diverted by the Government is delivered in bulk to the private canals or irrigation districts, which provide their own distributaries and operate them.

On most of the reclamation projects proper, where the Reclamation Service has built and operates the complete system of storage and distribution works, carrying water to each farm, the service has a force of ditch riders in daily touch with the irrigators. As the delivery of water declines toward the close of the season this organization, while still required for occasional deliveries, can perform other service and an opportunity is offered at little extra expense to collect data of the exact areas irrigated and the crops produced.

Such statistics have been collected for a number of years. Although, as indicated above, these figures do not show the entire development or crop production based on the works built under the reclamation law, they do show a large part of it and are complete enough to show clearly the nature of the crops grown, their relative importance in area, the values produced, and other factors.

This crop census for 1917 shows that in the present world crisis the reclamation projects are making a substantial contribution to the food supply. Seven million bushels of grain, an equal quantity of vegetables and truck, and 200,000,000 pounds of fruit were harvested from the lands covered by the census. A million and a half tons of hay and forage crops were produced and largely converted to animal products by feeding on the projects. Other crops included nearly 12,000,000 pounds of cotton, 30,000,000 pounds of cotton seed, and 300,000 tons of sugar beets which yielded probably 75,000,000 pounds of sugar. The total crop reported was worth $56,460,000, substantially more than that reported for any New England State at the last national census. Thus, in effect a new State has been added to the Nation in the matter of crop production, farm homes, and agricultural development. It is conservative to say that the crop and live-stock products on lands irrigated from the Government works, in value and nearly in variety, are sufficient to clothe and feed an army of a quarter of a million men.

Summary of 1917 crop reports by projects.[1]

State and project.	Irrigable acreage.[2]	Irrigated acreage.	Cropped acreage.[3]	Crop value.	
				Total.	Per acre.
Arizona, Salt River	[4] 212,960	[5] 201,600	188,500	$13,692,000	$72.60
Arizona-California, Yuma	65,000	36,956	35,578	3,752,669	105.47
California, Orland	20,480	12,729	9,608	543,570	56.57
Colorado:					
Grand Valley	35,000	5,289	4,523	198,960	44.00
Uncompahgre[6]	85,000	53,108	52,717	3,051,668	57.89
Idaho:					
Boise	[7] 223,000	[7] 117,024	....	....	....
Covered by census	143,780	95,524	88,732	4,386,545	49.44
Minidoka	120,850	99,020	92,456	5,119,043	55.15
Montana:					
Huntley	31,892	19,122	19,105	690,830	36.16
Milk River[8]	45,000	11,058	10,893	208,335	19.13
Sun River[9]	16,224	6,675	7,445	219,130	29.43
Montana-North Dakota, Lower Yellowstone[10]	42,232	15,744	15,659	459,557	29.35
Nebraska-Wyoming:					
North Platte	[11] 129,778	[11] 92,553	....	....	....
Covered by census	111,941	83,203	80,760	3,385,060	41.92
Nevada, Truckee-Carson	70,915	40,392	39,236	1,450,480	[12] 37.00
New Mexico, Carlsbad	24,775	16,882	15,729	623,818	39.66
New Mexico-Texas, Rio Grande	88,000	64,308	63,626	3,598,424	56.50
Oregon, Umatilla	26,300	7,335	5,546	311,395	56.15
Oregon-California, Klamath	44,715	33,635	32,929	847,200	25.73
South Dakota, Belle Fourche	83,335	50,272	50,026	1,171,239	23.50
Utah, Strawberry Valley	50,000	....	....	....	....
Covered by census	....	27,147	25,620	1,290,745	50.37
Washington:					
Okanogan	10,099	8,000	6,31	616,640	96.88
Yakima—					
Sunnyside unit	97,285	80,500	65,803	8,006,230	121.67
Tieton unit	33,422	25,400	24,425	1,777,595	72.80
Wyoming, Shoshone	43,263	32,764	31,554	1,061,180	33.63
Total	1,599,525	1,057,513	....	....	....
Covered by census	1,502,468	1,026,663	966,784	56,462,313	58.40

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[1] Excluding substantial areas (private canals) to which water is furnished under the Warren Act. Data are for calendar year (irrigation season) except on Salt River project data are for corresponding "agricultural year," October, 1916, to November, 1917.

[2] Area Reclamation Service was prepared to supply water.

[3] Irrigated crops. Excludes small areas on few projects cropped by dry farming.

[4] Includes so-called "dry lands" given right to rent water temporarily on account of ample storage.

[5] Includes about 5,000 acres within town sites, 3,000 acres reported "vacant" and probably largely pastured.

[6] Exclusive of relatively small area under private canals supplied Gunnison water.

[7] Irrigable acreage includes New York Canal, Nampa-Meridian, and Pioneer district lands served project water. Irrigated acreage here reported is limited to area served full water supply, excluding vested right lands given partial service.

[8] Crop reports covered an additional area of 8,780 acres cropped by dry farming, producing crops worth $47,548, or $5.42 per acre.

[9] Above figures are for 176 irrigated farms, which included small tracts farmed without irrigation. In addition, crop reports covered 17 farms operated without irrigation, on which 567 acres yielded crops worth $7,322, or $12.91 per acre.

[10] Crop reports covered an additional area of 8,739 acres dry-farmed, producing crops worth $90,550, or $10.36 per acre.

[11] Includes North Platte Canal & Colonization Co. lands.

[12] $51.36, excluding 10,100 acres of wild-grass pasture and 3,081 acres otherwise not in full production.

The crop statistics for 1917 covered an area of approximately 1,500,000 acres irrigable; that is, for which the service was prepared to supply water. Of this slightly over 1,000,000 acres, or two-thirds, were actually watered. This does not indicate a failure to utilize 500,000 acres and the water ready for it. A part of this balance under the most easterly projects is cultivated or pastured without irrigation. A part is public land which, though under ditch, is withheld from entry for a seasoning of the canals or other action preliminary to inviting in settlers. A small part is public land awaiting entry. Other tracts are State, railroad, or Indian land, more or less in process of subdivision and transfer to settlers.

But the largest part of this unirrigated land for which water is ready comprises a great number of small pieces of the irrigated farms.

The figure given as irrigable agrees with the official farm unit plats and is the total irrigable area on which water charges are based, but necessarily a part of this is taken up by the farmers' ditches, buildings, roads, and canals, so that it can not be cultivated. On this account the most complete use of the irrigable area to be ultimately expected will show the irrigation of from 80 to 90 per cent. Also the new settler of ordinary means can not put his whole unit to use the first year, nor the second, but gradually adds to the area leveled, cultivated, and irrigated. For this reason the irrigated area lags behind the irrigable, both increasing each year as new farms are brought under the extended canal systems and the older ones progress toward complete cultivation.

Of the 1,000,000 acres irrigated nearly 967,000 were harvested or pastured, the balance being devoted to young orchards not yet bearing, fall-planted alfalfa not cut until the following year, and similar items. Alfalfa continues to dominate the crop statistics, accounting for well over one-third the total area and value. As compared to the census of the preceding year all of the principal crops show substantial increase in both these respects, but in per cent of the total crop area and value, alfalfa shows a decrease of a few per cent. The same is true of other hays and forage, while increases are shown for vegetables and cotton, which registers the largest proportionate gain. Under the stimulus of high prices the cotton area was increased threefold in 1917 and this will probably be doubled in 1918. Cotton is grown on three southern projects. The most notable development of this industry is in the Salt River Valley of Arizona, where a superior product of long staple has been developed, bringing a price as high as 75 cents per pound.

Other high prices were enjoyed by the farmers on the Government projects, with resulting high returns. The average return for cotton was $180 per acre, for fruits $125, for sugar beets $69, for vegetable and truck crops $127. It must be remembered that war prices leading to these results are accompanied by labor shortage and higher production costs. The cereals, which entail the lowest production cost, returned an average of $34 per acre. For alfalfa this figure was $52, and the total value reported for all crops represents an average gross return of $58 per acre.

It should be noted that these figures are averages for all the Government projects, which are widely distributed throughout the West. Similarly the reports for each project give total and average figures for yields and values, with no effort to segregate either the more successful, which would show far greater returns than the average, or the failures, if any. Even if a crop failed entirely the field is included in the acreage figures used to determine average results. In other words, the crop reports are a complete crop census of certain large irrigated tracts, including old and new farms, the highest yields and the lowest, the best soils and the poorest, the most successful and the least successful farmers. Such figures do not begin to show the limit that can be attained, but do provide Congress and others interested in the reclamation of arid lands some index of the present accomplishment of the project settlers. The project census does not include any income from farm animals, but it is known that substantial additional returns are realized from sales of animals, poultry, dairy products, wool, and honey.

In the appended tables the crop reports are summarized by projects and by crops. In the appendix of this volume these figures are given in more detail and in the discussion of projects the crop report of each is given.

Summary of crop reports on reclamation projects in 1917.

Crop.	Acreage cropped.		Yields.			Crop value.		
	Total.	Per cent.	Unit.	Total.	Average per acre.	Average per acre.	Total.	Per cent.
Cereals:								
Barley	34,809	3.6	Bu.	916,060	26	$33	$1,151,960	2.0
Corn	33,146	3.4	Bu.	932,051	28	39	1,291,313	2.3
Oats	50,546	5.2	Bu.	1,343,956	27	21	1,079,045	1.9
Rye	1,742	.2	Bu.	16,031	9	15	25,554	.1
Wheat	114,814	11.9	Bu.	2,308,783	20	38	4,416,391	7.7
Total	235,057	24.3	Bu.	5,516,881	24	34	7,964,263	14.0
Other grain and seed:								
Alfalfa seed	8,730	.9	Bu.	38,903	4.5	43	373,078	.7
Clover seed	8,112	.8	Bu.	32,267	4.0	53	426,880	.7
Grain sorghum	36,985	3.9	Bu.	1,396,049	38	46	1,703,434	3.0
Flax seed	2,764	.3	Bu.	11,783	4.3	12	33,586	.1
Millet seed	341	....	Bu.	3,147	9	14	4,840	....
Total	56,932	5.9	Bu.	1,482,149	....	45	2,541,818	4.5
Hay and forage:								
Alfalfa hay	389,477	40.3	Ton.	1,254,782	3.2	52	20,440,653	36.2
Clover hay	10,403	1.1	Ton.	21,950	2.1	32	328,827	.6
Other hay	23,110	2.4	Ton.	22,523	1.0	18	427,772	.8
Corn fodder	8,726	.9	Ton.	31,547	3.6	42	365,045	.6
Peas	655	.1	Bu.	7,234	11	35	22,972	....
Other forage	2,985	.3	Ton.	30,883	10	101	302,033	.5
Pasture	121,308	12.5	....	....	....	[1] 15	1,832,178	3.3
Total	556,664	57.6	....	....	....	43	23,719,480	42.0
Vegetables and truck:								
Beans	14,856	1.5	Bu.	193,590	13	66	981,637	1.7
Onions	886	.1	Bu.	187,157	211	256	226,504	.4
Potatoes, white	29,181	3.0	Bu.	6,015,383	206	164	4,772,760	8.4
Potatoes, sweet	419	....	Bu.	22,343	53	75	31,409	.1
Truck	13,951	1.5	....	....	....	107	1,504,463	2.7
Total	59,293	6.1	....	....	....	127	7,516,773	13.3
Fruits and nuts:								
Apples	28,014	2.9	Lb.	157,059,460	5,600	113	3,164,764	5.6
Peaches	2,762	.3	Lb.	15,700,574	5,700	128	353,161	.6
Pears	3,204	.3	Lb.	15,711,457	4,900	160	515,203	.9
Prunes	575	.1	Lb.	4,233,425	7,400	252	144,792	.3
Citrus fruits	1,088	.1	Lb.	6,641,600	6,100	252	274,887	.5
Small fruit	1,187	.1	Lb.	5,231,640	4,400	157	186,125	.4
Other fruit and nuts	908	.1	Lb.	2,771,760	3,050	87	78,770	.1
Total[2]	37,738	3.9	Lb.	207,349,916	5,500	125	4,717,702	8.4
Miscellaneous:								
Sugar beets	32,924	3.4	Ton.	318,471	9.7	69	2,275,338	4.0
Cotton	40,166	4.2	Lb.	11,869,441	295	162	6,502,625	11.6
Cotton seed	....	....	Lb.	30,002,480	750	22	888,758	1.6
Cane	522	....	Ton.	1,177	2.3	41	21,191	....
Other crops	5,843	.6	....	....	....	54	314,365	.6
Total	79,455	8.2	....	....	....	126	10,002,277	17.8
Duplication	58,355	6.0	....	....	....	....	....	....
All crops	966,784	100.0	....	....	....	58	56,462,313	100.0

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[1] This figure does not represent average value of pasture for a year or season, as considerable areas pastured were also harvested and are included in the duplicated area.

GENERAL CONDITION OF SETTLERS.

The social and financial condition of settlers has on the whole been generally and rapidly improving. This is due to the growth of experience on the part of the settler, the high prices secured for most of his products, and the very liberal terms of repayment fixed by the United States in the reclamation extension act. Except in a few cases of individual misfortune, settlers are finding it practicable to repay the charges assessed by the Government and to rapidly increase improvements on the farms; and wherever serious effort has been made these results have followed, except on the one project previously described where the water supply has been short. This rapid improvement in their material condition has operated with great power to produce a growing feeling of optimism and contentment on the part of the settlers.

COMMENTS BY I. D. O'DONNELL, SUPERVISOR OF IRRIGATION.

The irrigated lands under the older units of the several projects have, for the most part, passed from the development stage into the stage of maximum production. The high level of prices for all farm products has given the irrigationists a splendid opportunity to improve their working equipment and living conditions; and it may now be said that all of the Government irrigation projects have passed beyond the development stage.

Crops.—The crop results on Government irrigation projects for the year 1917 show an increase in the cash returns per acre ranging from 50 to 100 per cent, as compared with 1916. This is not, of course, net gain, due to the fact that operating expenses, both in the operation of the irrigation works and the tilling of the soil and marketing of the crops, have been materially increased. The scarcity of labor, both for increasing the area to which irrigation water may be delivered and for the handling of new lands, has retarded to a considerable extent new development, with a prospect of further reduction in new work during the continuation of the war.

The experts on agricultural and animal husbandry, which are maintained on the Government projects by the Department of Agriculture, have continued their excellent work, having the advantage of past experience. The results of their endeavors are increasingly noticeable.

Farm loan law.—A serious disappointment to the project farmers is the failure to make the Federal farm loan law applicable to lands on which the Government holds first lien on account of the construction charges. On some projects, particularly where the need for more money to push production has been urgent, farmers have been unable to make a satisfactory showing because of their inability to secure funds at reasonable interest charges.

Operation of projects by water users.—The agitation among the landowners for the taking over of the operation and maintenance of the irrigation projects has been less noted during the past 12 months than during the 12 just preceding. This is partly due to the better financial conditions on many of the projects and to the scarcity of competent labor among the farmers to handle the irrigation works.

Operation and maintenance conferences.—Less interest in operation and maintenance conferences was noticeable during the last fiscal year. I believe these conferences should be continued at regular intervals, as questions of importance to all irrigationists are continuously arising, and the settlement of these questions and the exchange of valuable information should not be postponed during the time when maximum crop production is so important.

The Reclamation Record.—The value of the RECLAMATION RECORD, the official publication of the Reclamation Service, has increased. It now takes its place as one of the most valuable irrigation publications in the country. This publication should, by all means, be continued as a means of disseminating needed information on irrigation matters.

MR. O'DONNELL LEAVES THE SERVICE.

Mr. O'Donnell has found it necessary, on account of the demands of his private interests, to sever his connection with the Reclamation Service. His resignation has been accepted with keen regret by Secretary Lane, effective at the close of June 30, 1918.

Mr. O'Donnell has been connected with the service for nearly five years. His articles relating to all phases of farm management, which have appeared in the RECLAMATION RECORD from month to month, have been of great value to the settlers on our projects, and his attention to the individual troubles of the water users, his willingness to aid, and his scientific training and experience in agriculture have won for him a coveted reputation.

DRAINAGE.

A description of investigations and drainage work in progress will be found under the discussion of projects. Reference is also made to previous annual reports, especially the twelfth, thirteenth, fourteenth, and sixteenth, for discussion of the causes of seepage and water logging and the remedies necessary to reclaim and protect lands from damage.

A summary of work done and an estimate of seepage are shown in the accompanying table. The data relative to areas protected or to be protected by drains when completed are dependent on many varying factors. It is impossible in advance of complete irrigation over a given area to foretell with certainty what portion may become seeped and water-logged. The amount of water used and the manner in which it is applied to the soil are important factors in influencing the spread of seepage. These are dependent upon the care and skill of the irrigator. The natural drainage of different soils can be roughly approximated only, yet it is of great importance in preventing the rise of ground water. On account of these and other equally indeterminable factors the results given should be regarded as expressions of opinion rather than accurate engineering determinations.

Estimates of seepage and summary of drainage to June 30, 1918.

Projects.	Drains.		Estimated area damaged by seepage.	Estimated area protected by constructed drains.	Estimated area to be protected when all drains authorized are constructed.
	Open.	Closed.			
	Miles.	*Miles.*	*Acres.*	*Acres.*	*Acres.*
Arizona-California: Yuma	21.7	4.0	8,500	16,000	52,000
Colorado:					
Grand Valley	1.7		225	125	200
Grand Valley drainage district	1.9	.8	30,000	600	10,000
Uncompahgre			16,000		
Idaho:					
Boise—					
Riverside and Big Bend			7,000		10,000
Pioneer irrigation district	78.5	.8	10,500	30,000	30,000
Nampa-Meridian district	43.7		6,200	50,000	50,000
Other parts of project	9.7		2,050	3,500	3,500
King Hill	.30			600	
Minidoka	109.0		543	30,000	30,000
Montana:					
Flathead (Indian)	.18	2.97	440	1,240	1,240
Huntley	16.0	47.0	1,539	20,000	24,000
Milk River			500		
Sun River			2,200		
Montana-North Dakota: Lower Yellowstone	4.5	1.1	1,300	1,600	1,600
Nebraska-Wyoming: North Platte	25.6	13.2	3,500	5,300	6,500
Nevada: Truckee-Carson	14.23	3.99	11,500	15,000	19,500
New Mexico: Carlsbad	13.15	3.74	555	5,058	5,500
New Mexico-Texas: Rio Grande	44.8		118,000	20,500	145,000
Oregon:					
Klamath	89.1	8.2	7,000	18,800	29,600
Umatilla	10.0		200	2,000	2,000
South Dakota: Belle Fourche			2,668		
Washington:					
Yakima—					
Sunnyside			10,000	40,000	
Tieton			100		
Wyoming: Shoshone	13.7	75.6	1,500	22,000	39,000

POWER DEVELOPMENT.

Power development undertaken during the fiscal year 1918 was confined to supplying the demands of construction work and pumping plants giving assurance of prompt increase of crop production. The construction work in progress during the year is listed in the following table:

Project.	Plant.	Capacity.
Huntley	Ballantine auxiliary pumping plant . . . horse-power	400
North Platte	Lingle power plant . . . kilowatt	750
Yakima Storage	Tieton power plant No. 1 . . . do.	375
	Tieton power plant No. 2 . . . do.	1,000
Yakima-Sunnyside	Rocky Ford power plant . . . do.	187
	Grandview pumping plant . . . horse-power	414
	Prosser pumping plant . . . do.	174
	Spring Creek pumping plant . . . do.	211
Yuma	Yuma Valley drainage plant . . . do.	175

Preliminary studies were made of an extension of the Minidoka power plant involving the installation of two 5,000-kilowatt units and for the construction of the Price-Stub pumping plant on the Grand Valley project. Preliminary plans were completed and material purchased for the Chandler power plant and Goldfield-Superior transmission line on the Salt River project. This plant will contain a 600-kilowatt induction generator and is designed to operate with minimum attendance. This construction as well as that of the above transmission line is being completed by the water users' association which assumed the operation and maintenance of the project during the fiscal year.

The commercial power systems were extended by the construction of additional lines and substations. The more important of such extensions actually constructed or definitely planned are listed below:

Project.	Extension.	Capacity.
		Kilowatt.
Minidoka	Melcher line and substation	600
	Paul substation	225
	Unity substation	45
	East End substation	45
	Riverside substation	45
	Central substation	45
Strawberry Valley	Springville line and substation	180

An interesting feature of these developments is the extent to which strictly rural electric service has been extended by the formation of mutual companies purchasing power at wholesale from the United States and distributing it to stockholders on the basis of actual cost. In this way a considerable portion of the Minidoka project has already been supplied with power and lines are being gradually extended.

Numerous improvements were made in existing plants of the service and studies were in progress of possible future plants, including Arrowrock, Elephant Butte, and Yuma Mesa developments.

The following tables show the power and pumping plants installed on the various projects and the results of operation for the fiscal year:

Power plants operated by the United States Reclamation Service, fiscal year 1917–18.

Project.	Name of plant.	Type of generating unit.	Capacity.	Number of units.	Head.	First cost of plant.	Output.	Cost per kilowatt-hour, without depreciation.	Cost per kilowatt-hour, depreciation only.	Distribution of power generated (kilowatt-hours).					Gross income from power sales.
										Sold to consumers.	Used for irrigation pumping.	Used for construction.	Used for camp lights, etc.	Losses.	
			Kilowatts.		*Feet.*		*Kilowatt-hours.*	*Cents.*	*Cents.*						
Salt River[1]	Roosevelt	Hydro-electric.	10,000	6	80–226	$557,559.86	8,064,000	0.265	0.12	14,655,489	1,451,593	18,867	40,000	1,050,938	$109,253.09
Do	Crosscut	do	5,000	6	111	480,454.60	4,272,000	.197	.13						
Do	South Consolidated.	do	2,000	2	31	163,139.60	1,473,200	.202	.11						
Do	Arizona Falls	do	1,000	2	19	109,500.73	1,268,850	.195	.10						
Minidoka	Minidoka	do	7,000	5	[2] 48.34	484,904.82	47,139,290	.0308	.308	20,535,995	23,273,731	....	692,640	2,636,924	63,945.32
Boise[3]	Boise	do	1,875	3	30	167,905.37	5,103,950	....	....	5,050,911	....	....	53,039	....	10,780.00
North Platte[4]	Lingle	do	750	2	107	....	....	....	....	....	....	....	....	....	....
Truckee-Carson[5]	Lahontan	do	1,875	3	110	138,511.52	5,049,910	....	....	5,014,750	....	....	35,156	....	11,155.34
Rio Grande[6]	Power Plant No. 2	do	150	1	170	8,440.00	36,460	4.94	....	2,569	....	....	31,700	....	86.61
North Dakota pumping.	Williston	Steam-electric.	1,150	5	....	288,699.39	1,299,744	2.00	.185	1,027,000	....	....	218,815	53,929	32,186.00
Strawberry Valley	Spanish Fork	Hydro-electric.	850	2	125	59,849.05	967,630	1.406	.40	926,518	....	1,000	22,272	17,840	9,928.03
Okanogan	Power Plant No. 1	do	187	1	108	11,100.00	106,205	.643	....	29,674	76,531	....	....	....	783.14
Do	Power Plant No. 2	do	187	1	55	12,925.00	52,659	.649	....	14,837	37,822	....	....	....	891.57
Yakima-Storage	Tieton No. 1	do	270	2	40	45,492.13	620,684	.893	.691	67,000	....	448,033	105,651	....	1,005.08
Yakima-Sunnyside[7]	Rocky Ford	do	187	1	73	22,740.54	150,600	....	....	....	....	....	....	....	....

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[1] Operation costs are for months of July, August, September, and October, 1917. System taken over by water users Nov. 1, 1917.

[2] Yearly average.

[3] Leased to Electrical Investment Co. for 5 years beginning May 16, 1916.

[4] 50 per cent completed.

[5] Leased to Canyon Power Co. for 10 years beginning Dec. 1, 1914.

[6] Rates charged for industrial purposes, 3 cents per kilowatt-hour; for domestic uses, 10 cents per kilowatt-hour for first 10 kilowatt-hours and 8 cents thereafter.

[7] Operated by irrigation district; costs not available.

Pumping plants operated by the United States Reclamation Service during fiscal year 1917–18.

Project.	Name of plant.	Type of pumping unit.[1]	Capacity of prime movers.	Number of units.	Head pumped against.	First cost of plant.	Energy used for pumping.	Acre-feet pumped.	Cost per acre-foot.
			Horsepower.		*Feet.*		*Kilowatt-hours.*		
Salt River [2]	Battery A	V. M. D. C.	75	1	49.0	$16,425.49	....	518.5	$0.375
	Battery B	.....do.....	75	1	46.2	20,603.87	....	784.3	.824
	Battery C	.....do.....	75	1	48.4	16,734.94	....	1,365	.311
	Battery D	.....do.....	75	1	46.5	19,358.12	....	748.4	.384
	Battery E	.....do.....	75	1	44.5	21,848.29	....	898	.304
	Battery F	.....do.....	75	1	32.0	16,808.09	....	987	.264
	Clemans	H. M. D. C.	100	1	31.3	8,124.41	....	1,130	.530
	San Francisco.	.....do.....	100	1	30.0	29,978.98	....	355.4	3.38
	McQueen wells.	V. M. D. C.	75	1	40.0	17,254.44	....	557.4	.692
	Highline	H. M. D. C.	150	3	43.0	27,288.70	....	14,217	.267
Yuma	Reservation drainage.	G. E. D. C.	110	2	5.6	6,775.60	....	500	.55
	Valley pumping.	.....do.....	40	1	4.0	900.00	....	300	1.00
	Valley drainage.[3]	.....do.....	175	2	8–16	....	....	....	......
Minidoka	First lift	V. M. D. C.	2,760	5	29.10	180,314.33	9,298,980	208,460	.131
	Second lift	.....do.....	2,400	4	30.1	187,090.51	13,974,751	172,642	.131
	Third lift	.....do.....	1,560	3	30.0	99,951.49		102,093	.131
	West End	H. M. D. C.	150	2	20.83	18,371.56	....	....	......
	1812 station	Scoop wheel	10	1	5.32	3,636.04	....	....	......
	A-4 raise	.....do.....	25	1	2.91	3,202.34	....	....	......
	1817 raise	H. M. D. C.	5	1	3.48	1,008.76	....	....	......
	114 station	.....do.....	7.5	1	7.0	2,891.61	....	....	......
	Boersch Lake.	V. M. D. C.	100	2	22.0	....	....	....	......
Huntley	Ballantine direct.	V. T. D. C.	596	2	46.32	71,522.30	....	8,856	.166
	Ballantine auxiliary.[4]	G. E. D. C.	364	2	46.32	57,831.00	....	....	......
North Dakota Pumping.	Substation A.[4]	H. M. D. C.	640	4	56.0	36,019.71	....	....	......
	Substation E.[4]	S. T. D. C.	450	2	50.7	([5])	....	....	......
	Substation D.[4]	.....do.....	40	1	21.6	([5])	....	....	......
	Substation 2.[4]	H. M. D. C.	175	2	27.4	13,914.03	14,065	....	......
	Substation 4.[4]	.....do.....	100	1	27.4	8,187.44	8,281	....	......
	Barge [4]	.....do.....	540	4	32.0	36,479.04	....	....	......
Okanogan	Robinson Flat.	.....do.....	200	2	188.0	28,075.00	114,843	410	1.73
Yakima-Sunnyside.[6]	Snipes Mountain.	V. T. D. C.	500	2	200.0	47,328.21	....	6,278	......
	Hillcrest	.....do.....	35	1	113.0	5,934.21	....	395	......
	Outlook	.....do.....	800	2	112.0	97,296.69	....	14,061	......
	Grandview	1-V.T.D.C.	214	1	78.0	76,862.72	....	5,484	......
		2-H.M.D.C.	175	2	35.0			712	......
	Prosser [7]	H. T. D. C.	....	1	....	....	....	....	......
	Spring Creek.[7]	.....do.....	....	1	....	....	....	....	......

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[1] Type V. M. D. C.—vertical motor-driven centrifugal pump. Type H. M. D. C.—horizontal motor-driven centrifugal pump. Type S. T. D. C.—steam turbine-driven centrifugal pump. Type G. E. D. C.—gas-engine-driven centrifugal pump. Type V. T. D. C.—vertical hydraulic turbine-driven centrifugal pump.

[2] Operation data cover first four months of the year. System taken over by water users Nov. 1, 1917.

[3] Construction 85 per cent completed.

[4] Plant not operated during year.

[5] Part of steam plant.

[6] Pumping plants operated by irrigation districts; operating costs not available.

[7] Construction 70 per cent completed.

Contracts for sale of power in force June 30, 1918.

Project.	Name of contractor.	Date of contract.	Date of expiration.	Maximum load.	Rate.	Gross income fiscal year 1917-18.	Remarks.
				Kilowatts.	*Cents.*		
Minidoka[1]	City of Burley	Apr. 21, 1910	Apr. 21, 1920	3,000	½ to 2.7	$21,507.10	Heating rate is 50 to 75 cents per kilowatt per month.
Do	Rupert Electric Co	Mar. 16, 1910	Mar. 16, 1920	2,000	2.7 to 5	13,908.93	Do.
Do	Paul Electric Co	Jan. 20, 1914	Feb. 13, 1924	200	Standard	3,673.90	
Do	Village of Albion	Oct. 15, 1915	Jan. 8, 1926	100	do	3,670.30	$3,500 guaranteed from June 1, 1917, to June 1, 1918.
Do	Minidoka Irrigation District	Jan 2, 1916	Continuous pumping requirements.		3	3,120.88	Maximum demand is about 225 kilowatts in pumping season.
Do	Amalgamated Sugar Co	Oct. 16, 1912	Dec. 21, 1922	100	Standard	2,406.01	
Do	Village of Albion	Sept. 18, 1916	Jan. 8, 1926	200	See remarks	1,991.25	Heating contract: $1.25 per kilowatt per month.
Do	E. B. Skinner	Mar. 9, 1910	Mar. 9, 1920	1,500	2.7 to 5	1,517.77	Heating rate is 50 to 75 cents per kilowatt per month.
Do	Portland Feeder Co	Feb 12, 1917	July 1, 1918	42	Standard	1,042.40	
Do	Burley Milling & Elevator Co	Oct. 2, 1915	Nov. 5, 1920	10	do	656.99	Monthly guaranty, $33.33.
Do	Unity Light & Power Co	May 19, 1917	Mar. 19, 1927	10	do	583.98	
Do	Shodde Electric Co	May 24, 1915	June 28, 1925	7	do	306.36	
Do	Minidoka Irrigation District	Jan. 27, 1917	Apr. 4, 1927	24	do	251.56	Light and heat.
Do	George S. Matthews	Jan 24, 1917	Feb 1, 1927	8	do	194.35	
Do	Minidoka North Side Power Co	Apr. 1, 1913	Sept. 2, 1923	10	do	193.56	Using about twice their guaranty.
Do	Rural Electric Co	Mar. 19, 1917	Mar. 19, 1927	5	do	190.84	
Do	Farmers' Electric Co	June 1, 1914	June 29, 1924	2	do	157.78	
Do	Acequia Dairy & Produce Co	Mar 1, 1916	May 19, 1926	½	do	117.40	
Do	Geo. W. Curtis	Oct. 18, 1917	Oct. 18, 1927	5	do	99.08	
Do	West End Power Co. (Ltd.)	June 18, 1917	June 18, 1927		do	79.22	
Do	John M. Bell	Nov. 1, 1917	Nov. 1, 1918	5	do	60.90	
Do	E. C. Holley	May 25, 1915	Sept. 3, 1925	½	do	48.55	
Do	Thomas B. Anderson	Oct 21, 1914	Jan. 2, 1925	2	do	46.91	
Do	Noah C. Lowry	May 23, 1913	Dec. 11, 1923	5½	do	45.24	
Do	Fruitland Drive Power & Light Co	Oct. 22, 1917	Oct. 22, 1927	2	do	44.89	
Do	L. J. Camp	Nov. 2, 1917	Nov. 2, 1927	5	do	35.99	
Do	W. A. Drew	Oct. 21, 1914	Jan. 2, 1925	1	do	35.19	
Do	Mathias Christien	do	do	1	do	33.89	
Do	James A. Handy	Oct. 13, 1917	Oct. 13, 1927	4½	do	31.05	
Do	Harvey Moncur	Sept. 16, 1914	Oct. 9, 1924	1	do	24.14	
Do	A. F. Ames	Oct. 21, 1914	Jan. 2, 1925	1	do	23.55	
Do	J. R. Cattell	Sept. 25, 1914	Oct. 12, 1924	1	do	23.50	
Do	E. J. Hansen	Oct. 1, 1914	Jan. 13, 1925	½	do	21.75	
Do	Iri G. Clayville	Oct. 21, 1914	Jan. 2, 1925	1	do	21.64	
Do	James H. Lewis	do	Feb. 9, 1920	1	do	21.34	
Do	Lee St. Clair	Sept. 15, 1915	Oct. 1, 1925	½	do	20.20	

Do	John D. Hunsinger	Oct. 1, 1914	Jan. 2, 1925	1	do	20.01	
Do	E. T. Hollenbeck	Oct. 21, 1914	do	1	do	20.01	
Do	Isaac E. Holmes	June 6, 1917	June 6, 1927	1	do	18.97	
Do	Charles Swenson	do	do	1	do	18.86	
Do	C. A. Nelson	June 15, 1917	June 15, 1927	1	do	18.35	
Do	Abner B. Wallihan	Nov. 28, 1917	Nov. 28, 1927	3	do	17.50	
Do	W. M. Jordan	Dec. 8, 1915	Jan. 3, 1926	½	do	17.45	
Do	Theodore Jorgensen	July 27, 1917	July 27, 1918	1	do	16.86	
Do	North Heyburn Electric Co.	Feb. 6, 1918	Feb. 6, 1928	2	do	15.53	
Do	C. M. Foster	Jan. 1, 1918	Jan. 1, 1928	1	do	13.13	
Do	Frank W. True	Oct. 12, 1915	Jan. 3, 1926	½	do	12.74	
Do	Frederick Larson	Nov. 26, 1917	Nov. 26, 1927	1	do	12.19	
Do	William E. Helm	May 25, 1915	Sept. 3, 1925	⅓	do	11.73	
Do	W. A. Gill	Oct. 18, 1915	Jan. 11, 1926	½	do	11.40	Contractor pays guaranty; service not connected.
Do	E. B. Schrock	Dec 1, 1917	Dec. 1, 1927	1	do	10.49	
Do	Louis L. Yates	Dec. 26, 1917	Dec. 26, 1927	1	do	10.35	
Do	C. F. Yahn	Dec. 21, 1917	Dec. 21, 1927	1	do	10.35	
Do	Arthur Bros	Nov. 1, 1917	Nov. 1, 1927	1	do	10.35	
Do	R. F. Ray	Apr. 1, 1918	Apr. 1, 1928	4	do	5.38	
Do	D. A. Penrod	Apr. 9, 1918	Apr. 9, 1928	1	do	4.50	
Do	S. C. Sorenson	Mar. 14, 1918	Mar. 14, 1928	1	do	2.99	
Do	Melcher Mining & Milling Co.	July 27, 1917	Sept. 1, 1922	200	do		Service connected June 18, 1918.
Boise	Idaho Power Co.[2]	Mar. 1, 1916	May 1, 1921	1,875	35	10,780.00	Lease, see footnote 2.

[1] *Minidoka standard rates for electric light and power.*

For 50 hours' use of maximum demand	$2.00 per month per kilowatt.
Next 50 hours' use of maximum demand	.03 per kilowatt-hour.
Next 50 hours' use of maximum demand	.02 per kilowatt-hour.
Next 150 hours' use of maximum demand	.01 per kilowatt-hour.
Balance hours' use of maximum demand	.005 per kilowatt-hour.

Above rates increase 25 per cent during June, July, and August.

Above rates subject to discount for maximum demand of—	Per cent.
2 kilowatts and less than 4 kilowatts	2
4 kilowatts and less than 7 kilowatts	4
7 kilowatts and less than 11 kilowatts	6
11 kilowatts and less than 15 kilowatts	8
15 kilowatts and less than 19 kilowatts	10
19 kilowatts and less than 24 kilowatts	12
24 kilowatts and less than 29 kilowatts	14
29 kilowatts and less than 35 kilowatts	16
35 kilowatts and less than 41 kilowatts	18
41 kilowatts and less than 48 kilowatts	20
48 kilowatts and less than 57 kilowatts	22
57 kilowatts and less than 67 kilowatts	24
67 kilowatts and less than 80 kilowatts	26
80 kilowatts and less than 100 kilowatts	28
100 and over	30

Minimum payment shall not be less than $1.80 per month per kilowatt of the contractor's agreed maximum demand. All rates subject to 10 per cent discount if energy is delivered and metered at approximately 2,200 volts or more, or 8 per centi f delivered at 2,200 or more volts and metered at a lower voltage.

[2] Boise power plant leased to Idaho Power Co., formerly Electric Investment Co.

Contracts for sale of power in force June 30, 1918—Continued.

Project.	Name of contractor.	Date of contract.	Date of expiration.	Maximum load.	Rate.	Gross income fiscal year 1917–18.	Remarks.
				Kilowatts.	*Rate.*		
Truckee-Carson	Canyon Power Co	July 10, 1914	Nov. 30, 1924	1,500	½ to ⅞	11,155.34	Lease of Lahontan Power Plant.
North Dakota Pumping	City of Williston	Oct. 16, 1912	Dec. 20, 1922	600	2½ to 4½	32,186.00	
Strawberry Valley	Spanish Fork City	July 12, 1915	July 17, 1918	[1] 35,000	1	3,979.90	
Do	Payson City	Sept. 30, 1917	Sept. 30, 1920	[1] 15,000	1	4,579.75	
Do	Town of Salem	Jan. 19, 1915	Mar. 25, 1918	[1] 15,000	1½	720.60	New 10-year contract pending.
Do	Springville City	June 21, 1917	June 21, 1920	[1] 25,000	1 to 2	605.61	
Do	Joseph Lucas	Mar. 20, 1917	Mar. 20, 1918		9	37.17	
Okanogan	Okanogan Valley Power Co	May 10, 1917	May 10, 1920			1,174.71	Rate, $10 per day; 90 days minimum.

[1] Kilowatt-hours per month.

UNDEVELOPED POWER.

In the following table are listed the power sites more or less completely investigated by the Reclamation Service but which have not been developed. The data given are necessarily, in most cases, only roughly approximate.

Undeveloped water power.

Project.	Name of plant.	Head.	Horsepower.
Arizona-California:		*Feet.*	
Yuma	Drop in California Canal	10	1,200
Do	Araz	22	9,000
Do	Laguna Dam (doubtful)	9-18	4,000
California:			
Iron Canyon	Iron Canyon	60-130	35,000
Orland	Drop, high line to South Canal	27	678
Pit River	Hat Creek	200	9,000-12,000
Do	Fall River	70-400	7,000-40,000
Do	Big Bend	800-900	150,000
Colorado:			
Grand Valley [1]	Main Canal	31-48	3,000
Uncompahgre [1]	Various sites	18-160	40,000
Idaho:			
Boise	Arrowrock Dam	60-230	10,000-20,000
Do.[1]	Various sites	20-90	1,900
Minidoka	Minidoka Dam	46	10,000
Do	Head of Walcott Lake	46	30,000
Montana:			
Flathead (Indian)	No. 1 Newell Tunnel	169	130,000
Do	No. 2 Buffalo Dam	48	38,000
Do	No. 3	24	19,000
Do	No. 4	88	70,000
Do	No. 5	19	15,000
Huntley	Second drop, main canal	41	275
Montana-North Dakota:			
Lower Yellowstone [1]	Lateral K. K. drop	34	314
Nebraska:			
North Platte [1]	Pathfinder Dam	60-200	17,000-60,000
Nevada:			
Truckee-Carson	Lahontan	120	5,000
Do	26-foot drop	26	2,900
New Mexico-Texas: Rio Grande.	Elephant Butte Dam	65-185	12,000
Oregon:			
Columbia River	Celilo Falls	45-105	500,000-800,000
Deschutes	4 sites	65-110	90,000-100,000
Silver Lake	Silver Creek	48-120	2,900
Umatilla	Drainage outfall	28	145
Warner Valley	Deep Creek	....	2,000
Wilamette Valley	Santiam River and Marion Lake	....	14,000
Do	McKenzie River, 2 plants	415-550	30,500
Do	Middle Fork Willamette and Waldo Lake Storage.	[2] 4,400	65,000
Oregon-California: Klamath	Various sites	21-88	10,000
Utah: Strawberry Valley	Spanish Fork	126	1,500
Washington:			
Columbia River	Priest Rapids	60	200,000
Okanogan	Salmon Creek No. 1	347	2,000
Do	Salmon Creek No. 3	441	2,550
Yakima-Sunnyside	Mabton	44	131
Do	Main Canal	54	276
Yakima-Tieton	Lateral E	100	8,410
Yakima-Wapato	Drop 0	24	2,930
Do	Drop 1	40	4,083
Do	Drop 2	32	2,443
Do	Drop 3	34	1,488
Wyoming: Shoshone	Shoshone	200	40,000
Total			1,506,300-1,954,300

[1] Power from irrigation flow only.

[2] Several stages.

ELECTRICAL AND MECHANICAL ENGINEERING.

The electrical and mechanical engineering work of the service is handled by the electrical division of the Denver office. In addition to routine duties, the following work was accomplished by this division during the fiscal year ending June 30, 1918.

Arizona, Salt River project.—Equipment and material was purchased for the Chandler power plant and the Goldfield-Superior transmission line to supply power to the Magma Copper Co. Designs for the needle valve installation at the north tunnel of the Roosevelt Dam were completed and the construction of these valves in the factory of the El Paso Foundry & Machine Co. was followed. The completion of this work was assumed by the water-users' association, to whom the operation and maintenance of the project was turned over on November 1, 1917.

Arizona-California, Yuma project.—The designs of the Yuma Valley drainage pumping plant were completed and the project forces completed the construction of the plant to the extent necessary for the starting of the first two units. Preliminary studies and estimates were completed for the construction of the power and pumping plants for the irrigation of the Yuma Mesa.

Colorado, Grand Valley project.—Preliminary studies and estimates were made for the construction of the Price-Stub direct pumping plant to supply a portion of the lands now under the Stub canal of the Mesa County irrigation district.

Idaho, Boise project.—Further study was given to the possibility of developing power at the Arrowrock Dam and estimates for several small pumping plants at various points on the project were revised and brought up to date.

Idaho, Minidoka project.—Specifications and designs were prepared for the construction of a line and substation for supplying power to the Melcher Mining & Milling Co., 9 miles south of Albion, Idaho. Material and equipment were purchased for the Unity, Riverside, East End, and Central substations. These are small outdoor substations each consisting of a steel tower with line switch, transformers, and metering equipment and are used for supplying power to the distributing circuits of rural electric companies. Preliminary studies were made of an extension of the Minidoka power plant to accommodate two additional generating units, four additional transmission lines, and the necessary auxiliary equipment.

Montana, Huntley project.—The Ballantine auxiliary pumping plant, consisting of two 200-horsepower oil engines belted to centrifugal pumps was designed and all necessary equipment and material purchased. Project forces completed the construction work to the extent necessary for starting both units.

Nebraska-Wyoming, North Platte project.—Preliminary designs were completed and detailed designing begun of a needle valve outlet to be connected with the 4 by 6 foot culvert through the Pathfinder Dam. This installation is to consist of a sliding gate mounted below the dam and a needle valve with positive hydraulic control connected immediately below the gate valve.

Preliminary estimates were made for the construction of a hydroelectric plant and necessary transmission lines for supplying power to electric dragline excavators for the canals of the Fort Laramie unit. The plan finally adopted includes the development of power near Lingle, Wyo., under a head of 110 feet, between the Fort Laramie Canal and the North Platte River. The plant will contain two 375-kilowatt generators direct connected to spiral flume turbines. Power at 33,000 volts will be transmitted to points near the excavation work, where outdoor substations will be installed, stepping the current down to 4,000 volts for transmission to dragline excavators. All materials were purchased and designs for this development were completed. Construction work is in progress by Government forces. Specifications were prepared for the construction by contract of 45 miles of telephone line, but as no satisfactory bids were received the work was undertaken by Government forces.

Nevada, Truckee-Carson project.—The operation of the cylinder outlet gates for the Lahontan Dam was considered at a board meeting October 10, 1917, and in cooperation with the civil engineering division designs were worked out for necessary repairs. The required material was purchased and installation nearly completed.

North Dakota, North Dakota pumping project.—The matter of operating the project power and pumping system for irrigation during the season of 1919 was under consideration, as was also the extension of the commercial power system. Assistance was given in the appraisal and sale of the equipment from the Buford-Trenton pumping plant, which was definitely abandoned during the year.

New Mexico-Texas, Rio Grande project.—Assistance was given in the purchase, design, and operation of the gasoline engine driven dragline excavators on drainage work on the Rio Grande project. The operation of the Elephant Butte outlet valves was considered at a board meeting June 10, 1918, and plans developed for the improvement of the operation of these valves. A report was prepared on the development of power at the Elephant Butte Dam. The question of power development and construction of pumping plants for the irrigation of lands in the Palomas Valley was also under consideration.

Washington, Okanogan project.—Assistance was given in the purchase and installation of an auxiliary plant to relieve the water shortage on the Okanogan project.

Washington, Yakima project, storage unit.—The construction of Tieton power plant No. 1 was completed early in the fiscal year. Material and equipment were purchased and designs completed for Tieton power plant No. 2, consisting of two 500-kilowatt units, direct connected to spiral flume turbines. Assistance was given the construction engineer in the arrangement of electrical circuits for the construction plant and in the purchase of numerous items of construction equipment. Preliminary designs were prepared for the outlet works of the Tieton Dam and submitted to a board of engineers December 21, 1917. The plan tentatively adopted includes sliding emergency gates in a chamber in the diversion tunnel above the core wall of the dam and a steel pipe in the tunnel below this point, branching at the lower end to connect with the positive control needle valves discharging into the open canyon below the outlet of the tunnel.

Washington, Yakima project, Sunnyside unit.—The Grandview pumping plant was completed, placed in operation, and tested. Supplemental contract was made with the Platt Iron Works Co. for the correction of the defects in the Outlook pumping units. These units were placed in satisfactory operation at the beginning of the irrigation season and tested shortly thereafter. Supplemental contract was made with the Pelton Water Wheel Co. for improvements to the small pumping unit at the Snipes Mountain plant. Equipment was purchased and designs completed for the Prosser and Spring Creek pumping plants of the Prosser irrigation district.

CEMENT TESTING WORK.

On July 1, 1917, the cement testing work for the Reclamation Service was turned over to the Bureau of Standards of the Department of Commerce. Prior to that date this work was handled by a cement expert employed by the Service, and laboratories were maintained for this purpose at Denver and San Francisco.

The following table shows by years the number of barrels for which tests were made and the amount and per cent accepted since January 1, 1904, when the testing laboratory was established, to June 30, 1917, when the work was turned over to the Bureau of Standards. The amount accepted during the fiscal year 1918 is also given, but the per cent accepted can not be stated, as the testing was included in similar work handled for other departments and segregation is impracticable.

Year.	Amount for which tests were made.	Accepted.	
		Amount.	Per cent.
	Barrels.	*Barrels.*	
Jan. 1, 1904, to June 30, 1906	160,044	146,602	91.6
Year ending June 30, 1907	197,321	191,204	96.9
Year ending June 30, 1908	147,554	137,526	93.2
Year ending June 30, 1909	196,097	163.733	83.5
Year ending June 30, 1910	140,293	127,743	91.1
Year ending June 30, 1911	93,986	88,986	94.6
Year ending June 30, 1912	160,553	149,303	92.9
Year ending June 30, 1913	181,653	170,473	93.8
Year ending June 30, 1914	404,885	391,135	96.6
Year ending June 30, 1915	602,288	583.588	96.9
Year ending June 30, 1916	171,213	168,213	98.2
Year ending June 30, 1917	114,463	111,163	97.7
Year ending June 30, 1918	....	60,980	....
Total	....	2,490,649	....

Regular sets of long-time tests have been continued. In the appendix will be found a table giving the average results of all tests on accepted cement from January 1, 1904, to June 30, 1918.

PURCHASE OF MATERIAL AND SUPPLIES.

Most of the important purchases for the service are made by the Denver office, where a purchasing department is maintained. The project offices purchase direct perishable foods, forage, and such other commodities as can be purchased locally to best advantage. By purchasing through the Denver office all projects get the benefits inherent in large-scale purchases, and in the purchase of materials of construction the purchasing department of that office has the advantage of advice of the several engineers and technical departments.

Purchasing during the past year has been handicapped by very adverse market and transportation conditions. Deliveries have been slow, jobbers' stocks depleted, and factory deliveries without definite date.

During the fiscal year 1918 the total number of purchases was 6,215, with a total value of $1,809,580.84. The cash discounts earned by prompt payments of bills amounted to $17,876.29, which considerably more than offsets the total pay roll for the year, of $14,324.68.

Government bills of lading, numbering 5,858, were issued, covering the movement of freight, and 4,666 transportation requests issued for travel of employees in the service.

The following comparative tabulation shows a summary of data covering purchases made by the central purchasing office:

Fiscal year.	Number purchases.	Gross amount.	Discount.
1910	1,774	$504,023.60	....
1911	1,607	574,323.74	....
1912	2,205	930,018.53	....
1913	2,735	459,890.17	$4,286.29
1914	3,116	471,446.28	4,604.28
1915	2,854	454,661.46	3,842.09
1916	5,049	680,601.99	6,747,38
1917	4,989	1,095,830.36	13,000.25
1918	6,215	1,809,580.84	17,876.29
Total	30,544	6,980,376.97	50,356.58

FREIGHT, PASSENGER, AND EXPRESS TRANSPORTATION.

On July 1, 1917, the unsettled freight and express transportation charges amounted to $59,743.60. There were received during the fiscal year for administrative examination new bills filed for $341,795.68.

Bills filed for $347,533.60 were examined, the amount due found to be $324,562.28, and settlement arranged with claimants on that basis, leaving outstanding on June 30, 1918, bills amounting to $54,005.68.

The commercial charges on freight and express bills settled during the year would have amounted to $600,630.79.

Passenger transportation bills to the amount of $52,347 were also given administrative examination and transmitted to the Treasury Department for payment.

During the fiscal year there were filed with the various transportation companies, in accordance with freight contracts, refund claims on contractors' shipments amounting to $10,370.28, which, as paid, are covered into the reclamation fund.

The following table gives general data regarding freight and express transportation charges since 1906:

Fiscal year.	Bills settled.	Commercial charges.	Deducted account of contracts, land grant, and other causes.	
			Total.	Per cent.
1907	$278,782.10	$470,863.26	$192,081.16	40.8
1908	369,583.04	577,830.42	208,247.38	36.0
1909	778,047.12	1,403,970.10	625,922.98	44.5
1910	437,032.61	758,808.76	321,776.15	42.4
1911	405,360.55	666,876.59	261,516.04	39.2
1912	610,740.23	1,055,733.27	444,993.04	42.1
1913	481,118.91	837,077.59	355,958.68	42.5
1914	547,705.99	927,163.49	379,457.50	40.9
1915	778,893.33	1,393,347.96	614,454.63	44.1
1916	471,606.52	817,481.33	345,874.81	42.3
1917	393,477.70	653,013.98	259,536.28	39.7
1918	324,562.28	608,479.63	283,917.35	46.6
Total	5,876,910.38	10,170,646.38	4,293,736.00	42.2

LEGAL DIVISION.

The chief counsel is the legal adviser of the Secretary in matters relating to the work of the Reclamation Service and is the head of the legal division of the service. Under him are certain attorneys known as counsel, as well as various clerks and stenographers.

In the Washington office, within the year, the land and general section of the legal division has been incorporated with the law section under the latter name. The work now being done by this consolidated section covers not only the consideration of all of the many legal questions which are constantly arising in connection with the operations of the service, but extends to questions of administration and policy as well. The work includes the consideration of litigation, irrigation district organization, laws and legislation, departmental decisions and regulations, manual amendments, public notices, abstracts of title, contracts, withdrawals and restoration of public lands and water appropriations; also much general correspondence is handled.

In addition to the Washington office, there are nine field offices of the legal division, located respectively at Denver, Colo.; Montrose, Colo.; Scottsbluff, Nebr.; Helena, Mont.; Boise, Idaho; Yakima, Wash.; Portland, Oreg.; Los Angeles, Cal.; and El Paso, Tex. The attorneys in charge of these offices are known as district counsel.

In the central Denver office is located a district counsel who is the legal adviser to the chief of construction. Also at Denver is located a district counsel in general charge of irrigation district organization. In each of the other field offices the district counsel is the legal adviser to various project managers. One of the district counsel has special charge of the work of passing on titles to land.

The Reclamation Service is directly interested in a considerable amount of litigation involving several million dollars. The immediate supervision of litigated cases is in the Department of Justice, but the legal division of the service takes an active part in preparing and trying all such suits.

The legal report in connection with our investigation of the water-right situation in Colorado River Basin, including a digest of laws and decisions, a study of international and interstate questions, tabulations of all water-right filings, permits, and decrees, and a compilation of acreage irrigated, has been completed and filed.

In contemplation of Federal legislation providing for an investigation of unproductive swamp and cut-over timber lands, a study of the various State laws affecting this question is now being made by the legal division.

LITIGATION.

The following statement shows the general progress of litigation during the fiscal year:

Number of cases pending at beginning of year	52
Number of cases initiated during the year	50
Total	102
Number of cases disposed of during the year	29
Number of cases pending at the end of the year	73

CONTRACTS UNDER WARREN ACT.

[Act of Feb. 21, 1911, 36 Stat., 925.]

BOISE PROJECT, IDAHO.

Name of contractor.	Date of contract.	Amount of water in acre-feet.
Farmer's Union Ditch Co. (permanent)	Aug. 13, 1917	2,425
Pioneer Irrigation District (permanent)	Feb. 27, 1913	17,700
Nampa-Meridian District (permanent)	June 1, 1915	2,934
Riverside & Big Bend District (permanent)	Feb. 15, 1918	1,000
Settlers District (permanent)	Feb. 9, 1918	1,500
Farmer's Cooperative Ditch Co. (permanent)	Dec. 3, 1917	1,000
New York Canal Co. (temporary)	June 6, 1917	7,697

MINIDOKA PROJECT, JACKSON LAKE ENLARGMENT, IDAHO.

American Falls Canal Securities Co	Dec. 28, 1917	2,685
Armsberger, J. R	Aug. 15, 1917	80
Enterprise Irrigation District	Aug. 10, 1917	2,000
Farmers Friend Irrigation Co	June 18, 1917	2,000
Lenroot Canal Co. (Ltd.)	July 27, 1917	3,000
New Sweden Irrigation District	June 29, 1917	5,000
Poplar Irrigation District	May 1, 1917	1,200
Snake River Valley Irrigation District	Aug. 11, 1917	15,000
Sunnydell Irrigation District	June 8, 1917	4,000

NORTH PLATTE PROJECT, NEBRASKA-WYOMING.

Lincoln Land Co	Apr. 17, 1917[1]	1,941
Dawson County Irrigation Co	Feb. 26, 1918	5,000

BELLE FOURCHE PROJECT, SOUTH DAKOTA.

Beyer Aune and Bessie Hull Aune	May 2, 1918	(2)

STRAWBERRY VALLEY PROJECT, UTAH.

Springville Irrigation District	Dec. 29, 1917	2,400
Mapleton Irrigation District	Jan. 2, 1918	3,600

YAKIMA PROJECT, SUNNYSIDE UNIT, WASHINGTON.

Prosser Irrigation District	Dec. 1, 1917	(3)

[1] Approved Aug. 27, 1917.
[2] Sufficient for 36.8 acres.
[3] Not over 3 acre-feet per acre.

LEGISLATION.

Copies of acts of Congress, passed during the fiscal year, affecting the Reclamation Service, will be found in the appendix.

LAW DECISIONS.

A digest of law decisions affecting the Reclamation Service, which have been rendered during the fiscal year, will be found in the appendix.

PUBLIC NOTICES AND ORDERS.

Copies of the public notices and orders issued by the Secretary in regard to reclamation payments, etc., during the fiscal year will be found in connection with the text relating to the respective projects.

PURCHASES OF RIGHTS AND PROPERTY.

A statement of the transactions for the acquisition of rights and property is given in the appendix.

PERSONNEL.

On June 30, 1918, the force of the Reclamation Service comprised 5,288 persons, subdivided as follows: Educational, 507; noneducational, 1,301; laborers, 3,480. In addition, the employees of contractors working on reclamation projects numbered 301. A more detailed statement, giving the administrative personnel of the Service and the number of employees by projects, classified as above, will be found in the appendix.

Wages of labor.—A table in the appendix shows, by projects, the average daily wages paid for common labor in June and December for the past four years, and for June, 1918. This table shows that the average daily wages for such labor have increased from approximately $2 in June, 1914, to $3 in June, 1918, an increase of 50 per cent in the four years.

Injuries to employees.—Under the terms of the employees' compensation act of September 7, 1916, there have been 643 injuries reported from the date of the passage of the act to June 30, 1918. Claims to the number of 307 have been allowed, and a total of $20,700.53 has been paid to the claimants. A detailed statement, by projects, will be found in the appendix.

Inoculation with typhoid prophylactic.—During the fiscal year the service continued, in cooperation with the War Department, the use of typhoid prophylactic among the field force. Four hundred and fifty complete treatments were sent to the field, making a total since July, 1912, of 3,550.

Employees in military or naval service.—On November 1, 1918, the employees of the service who had joined the colors numbered 779, or approximately one-third of the total number from the Department of the Interior. Each project flies a service flag, and the Washington office a flag with a large central star containing the figures 779, and 25 small stars representing the employees from the Washington office alone, who have enlisted. The flag also contains one gold star, in honor of Eugene Snyder of the storage unit of the Yakima project, who was lost when the *Tuscania* was torpedoed by a German submarine.

Liberty loans.—The employees of the Reclamation Service have responded generously and willingly to the call of the Government for subscriptions to the Liberty loans, the subscription of the entire service to the second loan amounting to $175,800, to the third to $192,200, and to the fourth to $269,900. In addition, the employees are purchasing War Savings Stamps and have contributed freely to the funds raised for the benefit of the Red Cross, the Y. M. C. A., the Knights of Columbus, the Interior Department War Work Association, and other worthy organizations.

FINANCES.

The financial condition of the service may be summed up in the following condensed statement of total receipts and expenditures. The details of these expenditures are given in the appendix.

The statement of cash receipts and payments appearing below shows that-

At the beginning of the fiscal year there were $1,928,980.08 cash on hand.

During the year this amount was augmented by receipts from various sources to a grand total of $4,983,566.86.

At the close of the fiscal year the entire $20,000,000 authorized by the act of June 25, 1910 (36 Stat., 855), had been transferred to the reclamation fund.

Cash expenditures during the fiscal year were $8,691,808.22.

Town-site receipts were $60,990.56.

The balance on hand at the close of the fiscal year amounted to $1,811,007.08.

By the processes of the General Land Office and the Treasury Department the receipts from sales of public lands are held in the Treasury from six to nine months before they are placed to the credit of the reclamation fund. Estimated receipts from the sale of public lands in the hands of the Treasury Department on June 30, 1918, which had not been credited to the reclamation fund amounted to approximately $2,000,000.

The reclamation fund, which comprises the moneys received from the sale of public lands, has now reached the total of $93,812,659.15, and from the sale of town sites $394,153.93.

Transfer vouchers, adjusting accounts between the projects for the transfer of the value of services and equipment, amounted to $590,602.16 during the fiscal year 1918. Since the beginning of the service the value of the transfers of supplies, materials, equipment, and services between projects has amounted to $6,675,297.32. This system of transfers between projects has enabled the service to utilize equipment, materials, supplies, etc., to their fullest extent where needed and to charge the cost where the benefit accrued.

CASH TRANSACTIONS.

Below is shown, in the statement of cash receipts and payments, a summation of the cash transactions during the fiscal year 1918:

TABLE 1.—*Statement of cash receipts and payments, fiscal year 1918.*

RECEIPTS.

On hand July 1, 1918 (sixteenth annual report, p. 39)		$1,928,980.08
Original receipts:		
Public land sales	$1,922,576.30	
Town-site sales	60,990.56	
Bond loan	3,000,000.00	
		4,983,566.86
Repayment water-right charges		2,204,434.90
Miscellaneous receipts:		
Sales		409,941.35
Services		35,805.87
Water rentals		623,993.98
Power and light		223,594.16
Transportation refunds		19,772.91
Forfeitures by bidders		1,390.00
Over disbursements		1,503.39
Collections in project office not classified		130,418.03
Erroneous settlement by Treasury Department		404.33
		10,563,805.86

PAYMENTS.

From reclamation fund	$5,691,808.22	
From bond loan	3,000,000.00	
		8,691,808.22
Town-site receipts		60,990.56
Balance on hand to June 30, 1918:		
In Treasury	926,090.33	
Deposits to credit of special fiscal agents	754,498.72	
Project offices in process of deposit	130,418.03	
		1,811,007.08
		10,563,805.86

ASSETS, LIABILITIES, RESERVES, AND CAPITAL.

Below is presented a consolidated statement of the assets and liabilities, together with the reserves and capital, of the Reclamation Service as of June 30, 1918. This statement shows that the cash resources on June 30, 1918, were $3,011,007.08 and that all other resources, exclusive of the net expenditure for construction and deferred operation and maintenance charges, amounted to $56,248,848.34. This includes the unaccrued construction charges on contracts with water-right applicants, amounting to $52,172,881.97, as well as the estimated unearned value of construction work contracted, amounting to $1,065,723.06 on June 30, 1918. This latter amount is offset by a contra entry under contingent obligations, as the payment thereof is contingent upon the contractors fulfilling their contracts with the service. The gross cost for construction work in process amounts to $124,774,633.07, comprising the cost of irrigation works as shown in the statement of construction cost by functional features. From the gross expenditures is deducted all revenue earned during construction to June 30, 1918, amounting to $6,725,925.30, making the net cost of the construction work in process $118,048,422.66. The operation and maintenance cost amounts in all to $6,167,647.66. The grand total of assets is therefore $180,595,621.75. The liabilities of the service amount in all to $2,261,494.53. The reserves for repayment to the reclamation fund of the cost of the projects amount in all to $64,910,032.29. This contains not only the value of construction contracts with water-right applicants for the original acreage subscribed, but also the acreage on which charges have been temporarily suspended on account of the land becoming waterlogged or temporarily unfit for cultivation by reason of alkali, etc. It also includes the amount forfeited, penalties paid, and the construction charges paid in advance by water-right applicants. The latter includes the sum of $714,777.37, which amount covers construction work performed by the Salt River Valley Water Users' Association under contract with the United States for the construction of power plants and canals. It also includes the sum of $52,269, representing credits allowed canal companies and others for canal systems taken over by the Government, both of which are included in the gross construction cost of that project. The capital of the service is represented by the actual receipts from the sale of public lands, amounting in all to $93,812,659.15, plus the estimated amount of $2,000,000, now with the Treasury which has not yet been audited and placed to the credit of the reclamation fund. To this is added the $1,000,000 special appropriation for the Rio Grande Dam (34 Stat., 1357) and the $20,000,000 bond loan authorized by the act of June 25, 1910 (36 Stat., 835), the total capital to June 30, 1918, being $113,423,809.82, plus the net amount of moneys received from the Indian Service for work performed on projects in Montana, $1,177,186.51. This, added to the reserves and liabilities, equals the amount shown above as the assets.

TABLE 2.—*Consolidated balance sheet, Reclamation Fund projects, June 30, 1918.*

DEBITS.			
Collections returnable to fund through Treasury		$130,418.03	
Inventory of stock on hand		1,901,116 72	
Accounts receivable		53,411,956.93	
Construction work contracted		935,774.64	
Construction work in process	$124,775,501.41		
Less revenues earned during construction	6,727,078.75		
Net cost of construction of projects to date		118,048,422.66	
Operation and maintenance cost		6,167,647.66	
Total			$180,595,336.64
CREDITS.			
Accounts payable		$1,195,771.47	
Contingent obligations		1,065,723.06	
Reserves for repayment to reclamation fund of cost of projects		64,296,438.69	
Miscellaneous accruals		613,593.60	
Net capital invested		113,423,809.82	
Total			180,595,336.64

CONSTRUCTION COSTS BY FEATURES.

The statement which follows gives by features the cost of the construction of all storage works, canal systems, lateral systems, drainage and other protection systems, power systems, and other construction accounts of all projects, excluding the Blackfeet, Flathead, and Fort Peck Indian projects.

TABLE 3.—*Consolidated statement of construction cost and revenues.*

Feature.	Fiscal year 1918.	To end of fiscal year 1918.
COST.		
Examination and surveys	$126,956.70	$3,327,631.87
Storage works	484,602.97	31,349,547.57
Pumping for irrigation	151,671.61	1,212,805.90
Canal system	2,121,471.13	44,583,917.08
Lateral system	1,174,752.87	18,916,466.53
Drainage system	756,292.07	4,566,879.40
Flood protection	127,620.82	2,851,950.13
Power system	109,328.29	5,724,415.21
Farm units	81,680.45	539,491.46
Permanent improvements	192,331.51	2,798,837.69
Telephone system	25,413.19	459,744.40
Operation and maintenance during construction	697,988.27	6,620,065.97
Balance in plant accounts	468,040.34	1,433,231.63
Operation and maintenance compounded with construction	10,445.34	209,196.50
Unadjusted clearing accounts	62,379.85	181,320.07
Gross construction cost	6,590,975.41	124,775,501.41
REVENUES.		
Rental of buildings	10,279.77	231,737.32
Rental of grazing and farming lands	31,783.33	200,719.40
Net power earnings (prior to public notice)	351,362.32	1,036,790.41
Rental of irrigation water	756,298.29	4,708,479.05
Rental of telephone and tolls	28.20	7,417.60
Contractor's freight refunds	9,452.34	235,533.51
Other revenues, unclassified	107,372.42	317,349.37
Hospital operations, profit or loss	7,225.60	30,287.74
Railroad operations, profit or loss	1,229.07	[1]633.64
Other operations, unclassified	[1]61,462.47	[1]40,602.01
Gross revenues	1,213,568.87	6,727,078.75
Net cost of construction to June 30, 1918		118,048,422.66

[1] Deduct.

OPERATING REVENUES AND COSTS.

There follows a consolidated statement giving the revenues and costs for the operation of projects which have been opened by public notices of the Secretary of the Interior. These revenues and costs are those resulting from operations connected with the lands thrown open to water-right applicants by these public notices and do not include the transactions resulting from the temporary operation of canals during the construction period.

TABLE 4.—*Consolidated statement of operating costs and revenues.*

COSTS.

Feature.	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works	$92,017.62	$36,408.60	$128,426.22	$292,993.56	$172,549.37	$465,542.93
Pumping for irrigation	28,356.87	4,379.74	32,736.61	387,911.41	169,643.72	557,555.13
Canal system	100,535.02	225,400.81	325,935.83	582,701.13	1,367,068.38	1,949,769.51
Lateral system	207,051.43	501,867.13	708,918.56	1,295,687.17	2,547,105.61	3,842,792.78
Drainage system	593.26	15,986.75	16,580.01	41,471.09	152,801.03	194,272.12
Flood protection system					12,941.40	12,941.40
Undistributed expense	16,067.69	49,484.36	65,552.05	44,299.72	207,460.16	251,759.88
Supplemental construction chargeable to operation and maintenance					3,062.46	3,062.46
Maintenance of permanent improvements		7,175.86	7,175.86		16,764.83	16,764.83
Unpaid operation and maintenance added to construction	[1] 4,063.11	[1] 1,427.59	[1] 5,490.70	[1] 257,091.84	[1] 278,676.76	[1] 535,768.60
Farming operations		58.62	58.62	137.80	58.62	196.42
Miscellaneous expense	[1] 12,267.96	7,459.44	[1] 4,808.52	26,761.34	[1] 106,368.20	[1] 79,606.86
Total	428,290.82	846,793.72	1,275,084.54	2,414,871.38	4,264,410.62	6,679,282.00

REVENUES.

	Fiscal year 1918.	Total to end of fiscal year 1918
Operation and maintenance charges accrued on contracts with water.right applicants	$801,675.74	$4,230,866.23
Operation and maintenance charges paid in advance by water-right applicants.	[1] 1,306.37	5,394.02
Operation and maintenance charges paid and forfeited by water-right applicants	5,410.64	17,063.34
Operation and maintenance penalties accrued on contracts by water-right applicants	16,123.68	39,555.70
Rental of lands and buildings during operating period	15,666.62	53 711.85
Rental of irrigation water during operating period	81,450.52	422,938.39
Rental of telephone and tolls during operating period	95.42	883.82
Rental of power and light during operating period		1,869.20
Rental and other revenues unclassified	18 775.73	26 685.22
Discount allowed on operation and maintenance charges accrued on contract with water-right applicants	[1] 13,653.75	[1] 43,331.15
Total	924,238.23	4,755,636.62
Difference between cost and revenues [2]	350,846.31	1,923,645.38

[1] Deduct.

[2] Cost of operation and maintenance for six months of 1918 is included, but revenues for 1918 are not, because operation and maintenance charges are not payable until after close of calendar year as a rule.

REPAYMENT CONTRACTS.

The development of the projects has resulted in water-right applications or contracts that have been entered into with settlers, irrigation districts and associations, providing for repayment to the Government of the cost of constructing the works for irrigating their lands. These contracts, under provisions of the original reclamation law, and the reclamation extension act require complete repayment of construction charges in 10 and 20 annual installments, so graduated as to place upon the irrigator a minimum burden during the early years of farm development. On 19 projects the lands have been opened to entry and settlement and the construction charges fixed by public notice. Contracts with water-right applicants for repayment to the reclamation fund of the cost of projects total $58,131,628.85. Of this amount there has been collected $6,055,928.30 of the charges, leaving the unpaid value of these contracts on June 30, 1918, $52,075,700.55.

There are still large acreages of land on most of the projects to which the service is now ready to furnish irrigation water and which are being taken up from day to day and new contracts signed. When all of the lands susceptible of irrigation are covered by contracts, the value of the contracts on any project should equal the amount of the total investment thereon. It is to be noted in this connection, however, that on several of the projects additional investment will be necessary to make all of the lands irrigable.

ESTIMATED COST OF CONTEMPLATED WORK.

It is estimated that there will be expended during the fiscal year 1919 the sum of $7,502,450. The following table gives the tentative distribution of this amount to the various functional features of all projects, including the Blackfeet, Flathead, Fort Peck Indian and Riverton projects. The details are given under a similar heading for each project.

TABLE 5.—*Consolidated statement of estimated cost of work contemplated during fiscal year 1919.*

Examination and surveys	$95,950.00
Storage works	578,600.00
Pumping for irrigation	22,000.00
Canal system	1,518,680.00
Lateral system	966,950.00
Drainage system	1,451,900.00
Flood protection	13,000.00
Power system	281,000.00
Farm units	175,500.00
Permanent improvements	86,350.00
Telephone system	22,800.00
Operation and maintenance during construction (water rental)	644,020.00
Operation and maintenance under public notice	1,477,554.00
Reimbursable accounts	12,146.00
Plant and equipment	56,000.00
Secondary projects	100,000.00
Total	7,502,450.00

GENERAL FINANCIAL DATA FOR ALL PROJECTS.

The following statement shows general financial data for all projects:

TABLE 6.—*General financial data for all projects.*

Gross construction cost to June 30, 1918		$124,775,501.41
Appropriation for fiscal year 1919, total		9,445,000.00
Amount allotted for construction in July, 1918, fiscal year 1919		5,444,750.00
Appropriation fiscal year 1918		10,237,609.99
Expenditures during fiscal year chargeable to 1918 appropriation	$7,359,867.86	
Recorded current liabilities payable from 1918 appropriation	706,263.79	
Contract obligations payable from 1918 appropriation	333,705.90	
Estimated engineering expense on contract work payable from 1918 appropriation	25,221.24	
		8,425,058.79
Unencumbered balance July 1, 1918		1,812,551.20

TABLE 7.—*Repayments.*

Project.	Construction charges.			Operation and maintenance charges.			Water-rental charges.			Power earnings.		
	Accrued.	Collected.	Un-collected.	Accrued.	Collected.	Un-collected.	Accrued.	Collected.	Un-collected.	Accrued.	Collected.	Un-collected.
Salt River	$232,167.19	$232,167.19					$2,278,309.26	$2,278,309.26		$1,029,254.08	$1,029,254.08	
Yuma	458,301.81	291,822.13	$166,479.68	$125,371.74	$104,843.65	$20,528.09	388,339.33	387,422.75	$966.58			
Orland	36,082.04	36,082.04		26,477.48	26,382.17	95.31	119,600.22	119,600.22				
Grand Valley							25,807.31	24,423.03	1,384.28			
Uncompahgre							585,865.41	585,865.41				
Boise	222,487.35	200,208.40	22,278.95				655,814.77	633,249.16	22,565.61	64,025.11	64,025.11	
Minidoka	*859,045.92	*842,823.61	16,222.31	630,697.15	503,556.19	127,140.96	230,380.27	227,367.52	3,012.75	185,493.40	172,865.35	$12,628.05
Huntley	*289,189.04	*282,882.52	*6,306.52	171,524.39	157,967.12	13,557.27	1,182.16	1,100.09	82.07			
Sun River	112,746.65	109,284.63	3,462.02	64,328.20	60,135.08	4,193.12						
Lower Yellowstone	102,939.35	41,781.75	61,157.60	139,118.22	36,895.25	102,222.97	69,582.55	67,455.34	2,127.21			
North Platte	725,183.19	631,448.86	93,734.33	617,517.23	565,075.45	52,441.78	31,793.84	31,581.24	212.60			
Truckee-Carson	338,481.52	333,264.40	5,217.12	299,427.37	289,318.20	10,109.17	8,281.70	8,123.70	158.00	8,617.81	8,580.86	36.95
Carlsbad	188,207.71	180,587.57	7,620.14	209,176.18	197,194.34	11,981.84	14,377.43	14,249.03	128.40			
Rio Grande							420,703.63	375,612.07	45,091.56	2,243.33	2,243.33	
North Dakota pumping	48,202.29	8,863.18	39,339.11	24,278.91	12,964.28	11,314.63	2,948.58	2,149.03	799.55	138,138.10	133,303.10	4,835.00
Umatilla	232,579.50	213,615.83	18,963.67	124,911.49	105,731.04	19,180.45	18,036.50	17,527.88	508.62			
Klamath	*342,295.64	*340,319.66	*1,975.98	219,055.15	201,957.75	17,097.40	37,219.56	37,062.22	157.34	2,020.00	2,020.00	
Belle Fourche	266,833.14	251,969.17	14,863.97	278,740.34	237,854.59	40,885.75	2,624.69	2,474.69	150.00			
Strawberry Valley	88,147.99	82,379.58	5,768.41	39,085.57	38,057.09	1,028.48	2,074.89	2,074.89		56,268.15	54,570.30	1,697.85
Okanogan	34,041.54	31,232.53	2,809.01	55,316.22	46,776.97	8,539.25	106,199.82	99,200.92	6,998.90	1,754.71	1,754.71	
Yakima-Storage	414,281.00	413,351.00	930.00	21,721.57	21,692.03	29.54	4,305.00	4,305.00				
Yakima-Sunnyside	830,631.66	809,845.11	20,786.55	743,086.37	713,967.26	29,119.11	44,761.21	44,058.22	702.99	1,869.20	1,869.20	
Yakima-Tieton	391,516.62	373,699.00	17,817.62	256,374.19	233,215.46	23,158.73	1,760.50	1,760.50				
Shoshone	351,391.19	348,300.14	3,091.05	186,320.62	179,303.57	7,017.05	4,020.18	3,777.01	243.17			
Total	6,564,752.34	6,055,928.30	508.824.04	4,232,528.39	3,732,887.49	499,640.90	5,054,038.81	4,968,749.18	85,289.63	1,489,683.89	1,470,486.04	19,197.85

* Includes supplemental construction charges.

Project.	To be collected as operation and maintenance.	Collected as operation and maintenance.	Uncollected as operation and maintenance.
Minidoka	$73,634.85	$73,169.92	$464.93
Huntley	1,936.60	1,124.54	812.06
Klamath	527.50	113.75	413.75
Total	76,098.95	74,408.21	1,690.74

COST OF INVESTING THE RECLAMATION FUND.

In the thirteenth annual report there was for the first time presented a statement of the general expenses by calendar years showing the gross expenditures and the ratio of the general expense thereto. The figures shown for general expense were estimates based on partial returns from an investigation instituted to determine the ratio of general expense to all other expenditures. These accounts, as presented in the thirteenth annual report, had been kept by calendar years, but owing to the change of policy involving annual appropriations by fiscal years, a readjustment of these accounts was immediately undertaken.

There is presented herewith a statement showing by fiscal years the actual gross cost from the reclamation fund and the actual total amount of general expense, together with the ratio of general to all other expenditures. The results shown by this table differ somewhat from those given in the table of estimates presented in the thirteenth annual report. By reference to the table which follows it will be found that the average cost of investing $100 in the construction and maintenance of the permanent works of the Reclamation Service has been $8.75 during the past 15 fiscal years.

TABLE 8.—*Statement showing, by fiscal years, the gross expenditures from the reclamation fund less general expense, the total amount of general expenses of the service, and the ratio of general expenses to all other expenditures.*

Fiscal year.	Gross Expenditures exclusive of general expense.	General expense.	Ratio of general to all other expenditures.
1903	$245,548.27	$23,546.20	9.59
1904	1,395,178.17	118,253.05	8.48
1905	3,450,812.79	319,384.44	9.25
1906	7,007,285.71	546,237.15	7.79
1907	12,188,889.67	755,164.91	6.19
1908	11,358,174.72	792,970.33	6.98
1909	10,037,536.09	887,484.08	8.84
1910	9,543,060.87	873,496.00	9.15
1911	9,100,885.25	897,501.27	9.86
1912	11,316,314.42	892,565.41	7.89
1913	8,507,467.36	958,443.72	11.27
1914	10,055,187.91	1,002,333.39	9.97
1915	14,583,178.54	1,058,809.24	7.26
1916	10,110,983.77	1,077,485.42	10.65
1917	10,088,392.04	1,080,303.78	10.71
1918	9,282,510.38	1,024,052.94	11.03
Total	138,271,405.96	12,308,031.33	8.90

RECEIPTS, BY STATES.

The table following gives a statement of additions to the reclamation fund from the sale of public lands, by States.

TABLE 9.—*Reclamation fund accretions from the sale of public lands.*

States.	Actual receipts from sales of public land, exclusive of town-site sales, transferred to credit of reclamation fund.		Estimated receipts with Treasurer United States on June 30, 1918, not yet audited.	Total estimated receipts from sales of public land, exclusive of town-site sales, to June 30, 1918.
	Fiscal year 1918.	Total to June 30, 1918.		
Arizona	$81,369.65	$1,533,249.22	$50,000.00	$1,583,249.22
California	177,971.29	6,381,762.29	275,000.00	6,656,762.29
Colorado	209,077.33	8,202,446.60	325,000.00	8,527,446.60
Idaho	131,895.72	5,916,359.51	175,000.00	6,091,359.51
Kansas	4,481.67	1,015,326.09	5,000.00	1,020,326.09
Montana	598,925.74	12,408,414.06	425,000.00	12,833,414.06
Nebraska	46,541.03	1,929,185.90	50,000.00	1,979,185.90
Nevada	20,701.61	691,327.16	10,000.00	701,327.16
New Mexico	95,112.62	4,714,158.51	150,000.00	4,864,158.51
North Dakota	14,738.15	12,151,520.34	30,000.00	12,181,520.34
Oklahoma	14,539.14	5,867,860.16	5,000.00	5,872,860.16
Oregon	60,465.47	10,971,698.11	100,000.00	11,071,698.11
South Dakota	39,864.35	7,373,575.34	100,000.00	7,473,575.34
Utah	197,239.08	2,337,948.95	50,000.00	2,387,948.95
Washington	45,746.95	7,021,686.67	50,000.00	7,071,686.67
Wyoming	183,906.50	5,296,140.24	200,000.00	5,496,140.24
Total	1,922,576.30	93,812,659.15	2,000,000.00	95,812,659.15

RECEIPTS, BY YEARS, FROM SALES OF PUBLIC LANDS.

During the fiscal year 1917 the General Land Office collected from the sales of public lands, not including town-site sales, a total of $3,290,671.99, which resulted in the addition to the fund of $2,865,386.34. During the fiscal year 1918 the gross receipts were approximately $2,964,311.72. Of this amount $668,945.77 has been credited to the reclamation fund, and it is estimated that there is a balance of $2,000,000, which will be available before the end of the calendar year.

The following table shows the gross receipts from the sale of public lands and the corresponding accruals to the reclamation fund by fiscal years since the passage of the reclamation law:

TABLE 10.—*Total receipts from the sale of public lands and resulting accruals to the reclamation fund.*

Fiscal year.	Total receipts from sale of public lands in reclamation States (not including town-site sales).	Accruals to the reclamation fund.		Total receipts from sale of town sites in reclamation States.
		Amount (not including town-site sales).	Per cent of total receipts.	
1901	$3,618,546.38	$3,144,821.91	86.908	....
1902	5,115,619.61	4,585,520.53	89.637	....
1903	9,395,741.68	8,713,996.60	92.744	....
1904	7,605,978.29	6,826,253.59	89.748	....
1905	5,328,084.07	4,805,515.39	90,192	....
1906	5,732,554.35	5,166,336.50	90.122	....
1907	8.471,757.75	7,914,131.71	93.417	$61,535.00
1908	10,235,294.28	9,430,573.98	92.137	12,864.06
1909	8,391,938.83	7,755,466.81	92.415	10,017.85
1910	7,679,421.61	7,028,185.73	91.521	60,112.86
1911	6,631,000.12	6,135,547.76	92.528	69,468.80
1912	6,324,012.34	5,657,498.88	89.460	15,224.10
1913	4,202,946.67	3,737,910.55	88.935	17,784.74
1914	4,058,991.61	3,460,451.63	85.229	15,280.25
1915	3,719,754.90	3,268,057.73	87.856	18,436.28
1916	3,186,239.81	2,648,057.74	83.109	21,189.28
1917	3,290,671.99	2,865,386.34	87.076	31,250.15
1918	2,964,311.72	[1]2,668,945.77	90.227	60,990.56
Total	105,952,866.01	95,812,659.15	90.85	394,153.93

[1] Actual accruals to Dec. 31, 1917, $668,945.77; balance estimated.

ALLOTMENTS AND NET INVESTMENT, BY PROJECTS AND BY STATES.

This statement shows the amount of money allotted to each project, the amount of money expended on each project to June 30, 1918, and the amount of money allotted to States and expended in the respective States for the same period:

TABLE 11.—*Statement of project allotments and net investments by States, to June 30, 1918.*

State and project.	Allotments.		Net investment.	
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Arizona:				
Salt River	$205,300.00	$14,751,800.00	[1] $161,525.26	$10,337,500.75
Yuma	421,640.00	8,423,089.00	282,592.04	7,353,397.55
Colorado River		36,279.30		36,279.30
Colorado River Basin	15,023.00	131,833.05	13,237.35	112,752.18
Little Colorado		9,554.33		9,554.33
San Carlos		24,829.51		24,829.51
San Pedro		2,427.34		2,427.34
Arizona cooperative		3,500.00	1,336.82	2,025.51
Preliminary investigation		39,578.78		39,578.78
Total	641,963.00	23,422,891.31	135,640.95	17,918,345.25
California:				
Yuma	86,360.00	1,725,211.00	57,880.30	1,506,117.93
Orland	47,000.00	1,086,600.00	[1] 4,133.48	871,379.66
Klamath	50,750.00	851,550.00	20,391.35	664,130.50
Colorado River		7,430.70		7,430.70
Colorado River Basin	3,077.00	27,001.95	2,711.27	23,093.82
Iron Canyon		19,185.96	[1] 714.88	9,064.57
Pitt River		2,530.25		2,499.18
Shasta County		3,346.65		2,144.75
Lassen County		5,299.15		1,945.60
Owens Valley		12,061.92		12,061.92
Sacramento Valley		43,620.72		43,620.72
San Joaquin		3,531.20		3,531.20
Imperial Valley	1,550.00	5,550.00	1,567.87	4,337.85
Kings River storage		1,500.00		1,157.70
Preliminary investigation		7,952.48		7,952.48
Total	188,737.00	3,802,371.98	77,702.43	3,160,468.58
Colorado:				
Grand Valley	250,000.00	3,391,300.00	174,234.84	3,255,585.17
Uncompahgre	428,000.00	7,427,700.00	250,546.75	6,498,048.68
White River		4,357.00		4,357.00
Preliminary investigation		3,718.75		3,718.75
Total	678,000.00	10,827,075.75	424,781.59	9,761,709.60
Idaho:				
Boise	417,740.00	13,491,940.00	[1] 80,177.30	11,667,535.67
King Hill	226,500.00	233,875.00	208,300.63	212,483.55
Minidoka	271,000.00	6,935,400.00	[1] 119,362.70	4,825,670.83
Dubois		17,228.91		17,252.06
Island Park	5,000.00	5,000.00	2,960.84	2,960.84
Port Neuf		2,168.01		2,168.01
General investigation		4,000.00	34.50	1,226.28
Swan Valley		800.00		544.88
Total	920,240.00	20,690,411.92	11,755.97	16,729,842.12
Kansas: Garden City	500.00	397,800.00	[1] 37,739.50	338,214.61
Montana:				
Huntley	180,000.00	2,272,600.00	126,913.43	1,499,996.68
Milk River	172,350.00	3,361,050.00	248,264.76	3,163,419.39
Milk River, St. Mary storage	183,500.00	2,747,900.00	175,711.08	2,459,857.52
Sun River	173,300.00	3,795,900.00	191,155.26	3,345,723.68
Lower Yellowstone	37,751.00	2,461,641.00	1,196.87	2,271,396.30
Clark Fork		5,581.23		5,581.23
Crow Reservation		18,911.96		18,911.96
Lake Basin		7,103.26		7,103.26
Madison River		10,729.09		10,729.09
Marias		13,559.01	[1] 3,538.24	9,960.36
Total	746,901.00	14,694,975.55	739,703.16	12,792,679.47

[1] Deduct.

TABLE 11.—*Statement of project allotments and net investments, by States, to June 30, 1918*—Continued.

State and project.	Allotments.		Net investment.	
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Nebraska:				
North Platte	$913,500.00	$7,755,510.00	$848,546.44	$6,205,631.31
Nebraska investigation		10,500.00		3,381.70
North Platte cooperative	4,000.00	4,000.00	274.80	274.80
South Platte		2,877,01		2,877.01
Total	917,500.00	7,772,887.01	848,821.24	6,212,164.82
Nevada:				
Truckee Carson	546,000.00	7,228,100.00	191,486.52	6,003,063.88
Walker River		12,503.63		12,503.63
Walker River investigation		4,050.00		1,192.74
Total	546,000.00	7,244,653.63	191,486.52	6,016,760.25
New Mexico:				
Carlsbad	81,400.00	1,650,500.00	104,020.00	1,219,084.30
Hondo		408,100.00	[1] 17.76	372,102.69
Rio Grande	832,560.00	5,538,660.00	563,181.10	4,065,619.61
La Plata		28,064.33		28,064.33
Las Vegas		5,014.09		5,014.09
Urton Lake		17,464.70		17,464.70
Preliminary investigation		2,738.91		2,738.91
Total	913,960.00	7,650,542.03	667,183.34	5,710,088.63
North Dakota:				
North Dakota pumping	40,900.00	1,308,500.00	2,539.97	944,646.07
Lower Yellowstone	16,179.00	1,054,989.00	512.94	973,455.55
Bismark		13,621.69		13,621.69
Little Missouri		11,933.52		11,933.52
Nesson		17,471.83		17,471.83
Washburn		10,532.73		10,532.73
Bowman		3,236.64	[1] 747.80	1,913.04
Preliminary investigation		4,961.03		4,961.03
Total	57,079.00	2,425,246.44	2,305.11	1,978,535.46
Oklahoma:				
Lawton	500.00	62,500.00	452.02	13,798.17
Cimarron		8,891.17		8,891.17
Red River		60,209.27		60,209.27
Investigation		400.00		400.00
Turkey Creek		250.00		137.30
Total	500.00	132,250.44	452.02	83,435.91
Oregon:				
Umatilla	141,400.00	2,897,600.00	30,903.10	2,263,260.24
Klamath	152,250.00	2,554,650.00	61,174.05	1,992,391.52
Central Oregon		40,346.41		40,346.41
Columbia River cooperative		20,037.47		17,008.51
Malheur		83,490.62		83,490.62
Oregon cooperative		60,761.49	[1] 4,320.92	45,687.74
Preliminary investigation		943.79		943.79
Teel district	500.00	500.00	456.35	456.35
Total	294,150.00	5,658,329.78	88,212.58	4,443,585.18
South Dakota:				
Angostura	7,100.00	7,100.00	3,310.01	3,310.01
Belle Fourche	101,350.00	4,064,550.00	[1] 35,599.98	3,374,225.11
Preliminary investigation		16,818.04		16,818.04
Total	108,450.00	4,088,468.04	[1] 32,289.97	3,394,353.16
Texas:				
Rio Grande	555,040.00	3,692,440.00	375,454.07	2,710,413.07
Pecos River investigation	500.00	9,400.00	[1] 1,043.02	6,072.45
Total	555,540.00	3,701,840.00	374,411.05	2,716,485.52
Utah:				
Strawberry Valley	165,000.00	3,816,000.00	77,014.38	3,332,003.57
Bear Lake		18,827.72		18,827.72
Monmouth	500.00	500.00	404.27	404.27

[1] Deduct.

TABLE 11.—*Statement of project allotments and net investments, by States, to June 30, 1918*—Continued.

State and project.	Allotments.		Net investment.	
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Utah—Continued.				
Utah Lake		$34,049.30		$34,049.30
Provo-Weber		141.35		141.35
General investigation	$5,300.00	5,300.00	$1,760.32	1,760.32
Total	170,800.00	3,874,818.37	79,178.97	3,387,186.53
Washington:				
Okanogan	29,500.00	1,011,300.00	1,582.34	783,855.45
Yakima, storage			821,995.04	3,323,265.34
Yakima, Sunnyside	1,370,500.00	12,307,100.00	84,278.43	2,538,696.44
Yakima, Tieton			[1] 28,902.58	2,843,976.38
Benton		11,105.05	[1] 31.20	11,011.45
Kittitas		19,366.90	[1] 773.38	18,593.52
Wapato		36,465.77		36,465.77
Palouse		76,393.01	[1] 1,656.05	74,736.96
Palouse cooperative		12,956.56		10,201.92
Preliminary investigation		3,776.95		3,776.95
Priest Rapids		6,216.01		6,216.01
Total	1,400,000.00	13,484,680.25	876,492.60	9,650,796.19
Wyoming:				
North Platte	391,500.00	3,323,790.00	368,662.76	2,659,556.28
Shoshone	526,900.00	6,193,700.00	390,446.88	5,086,964.56
De Smet		8,917.38		8,917.38
Wyoming cooperative		4,000.00	[1] 1.25	3,681.76
Pathfinder pumping		2,360.00		1,554.96
Riverton	5,000.00	8,300.00	[1] 2,101.80	265.72
Total	923,400.00	9,541,067.38	757,006.59	7,760,940.66
General accounts		7,922,980.12	[1] 40,039.08	70,576.40
General investigations	12,500.00	12,500.00	6,306.09	6,306.09
Total	12,500.00	7,935,480.12	[1] 33,732.99	76,882.49
Grand total	9,076,220.00	147,345,790.00	5,171,371.66	112,132,474.43

[1] Deduct.

RECONCILING ADMINISTRATIVE ACCOUNTS WITH TREASURY DEPARTMENT BALANCES AND STATEMENTS.

The accounts of the Treasury Department are limited to the movement of cash, either by withdrawal or deposit to the appropriations involved. The administrative accounts of the Reclamation Service, as entered in the tables herein, show the amount, both for receipts and disbursements, upon an accrual basis. The cash account, however, must, if correct, agree with the Treasury Department statement of funds made available by appropriations, reimbursements, expenditures, and withdrawals. Table 12 below, shows a condensed statement of cash collected, appropriated, disbursed, and on hand, and Table 13 gives a reconciliation of the amounts of the appropriations, withdrawals, and balances used in the preparation of these financial tables, with the figures shown by the statements of the Treasury Department.

TABLE 12.—*Reclamation fund account to June 30, 1918.*

Item.		Debit.	Credit.
Balance, end of fiscal year as per sixteenth annual report			$92,223,246.22
Receipts during fiscal year 1918:			
Appropriation warrant—			
No. 20, Sept. 7, 1917	$644,130.67		
No. 22, Sept. 29, 1917	18,499.36		
No. 38, Dec. 31, 1917	16,277.22		
No. 44, Jan. 31, 1918	609,499.86		
No. 48, Mar. 30, 1918	22,535.79		
No. 56, May 23, 1918	668,945.77		
No. 68, June 30, 1918	3,678.19		
			1,983,566.86
Special reclamation fund, reimbursable, act of June 25, 1910 (36 Stat., 835)—			
Balance end of fiscal year 1917 as per sixteenth annual report, Table No. 6			17,000,000.00
No. 17, Aug. 31, 1917	$500,000.00		
No. 26, Oct. 15, 1917	500,000.00		
No. 31, Nov. 27, 1917	500,000.00		
No. 35, Dec. 26, 1917	500,000.00		
No. 41, Jan. 15, 1918	500,000.00		
No. 59, June 18, 1918	500,000.00		
			3,000,000.00
Total			114,206,813.08
Disbursements, 439,392 vouchers, as per Table 14		$136,616,578.87	
Collection vouchers, as per Table 15			24,484,104.44
Balance with Treasurer United States, as per Table 13		926,090.33	
Balance with special fiscal agents		754,498.72	
Town-site collections credited to reclamation fund		394,153.93	
Erroneous settlement by Treasury Department			404.33
Total		138,691,321.85	138,691,321.85

TABLE 13.—*Balance of reclamation fund with the Treasurer of the United States, June 30, 1918.*

Item.		Appropriation.	Withdrawals.	Balance.
Total and balance, end of fiscal year 1917, as per sixteenth annual report, Table 5		$109,223,246.22	$108,093,033.89	$1,130,212.33
Reclamation fund		1,983,566.86		
Special reclamation fund, reimbursable, act of June 25, 1910 (36 Stat., 835)		3,000,000.00	5,153,431.95	[1] 169,865.09
Total and balance as per statement of Treasury Department		114,206,813.08	113,246,465.84	960,347.24
For items in Reclamation Service Accounts, but not included in above add withdrawals on direct settlement by auditor	$44,060.45			
Deduct repayments on direct settlements	9,803.54			
			34,256.91	34,256.91
Total		114,206,813.08	113,280,722.75	926,090.33

[1] Deduct.

TABLE 14.—*Disbursement vouchers paid to June 30, 1918.*

Fiscal year.	Quarter ended—	Number of vouchers.	Amount.
Balance from sixteenth annual report		408,989	$127,924,770.65
1918	Sept. 30, 1917	7,510	2,145,482.65
	Dec. 31, 1917	8,186	2,223,546.86
	Mar. 31, 1918	7,099	1,983,299.01
	June 30, 1918	7,608	2,339,479.70
Total to June 30, 1918		439,392	136,616,578.87

TABLE 15.—*Collection vouchers paid to June 30, 1918.*

Fiscal year.	Quarter ended—	Number of vouchers.	Amount.
Balance from sixteenth annual report		168,465	$20,963,667.88
1918	Sept. 30, 1917	8,636	615,660.39
	Dec. 31, 1917	12,213	1,012,815.38
	Mar. 31, 1918	14,019	1,162,456.59
	June 30, 1918	9,383	729,504.20
Total to June 30, 1918		212,716	24,484,104.44

TABLE 16.—*Transfer vouchers approved to June 30, 1918.*

Fiscal year.	Quarter ended—	Number of vouchers.	Amount.
Balance from sixteenth annual report		10,866	$6,084,695.16
1918	Sept. 30, 1917	233	127,872.71
	Dec. 31, 1917	237	142,699.13
	Mar. 31, 1918	249	146,281.30
	June 30, 1918	225	173,749.02
Total to June 30, 1918		11,810	6,675,297.32

INVESTMENT OF THE UNITED STATES IN PROJECTS.

Below is given a statement showing cash disbursed and received on account of the several projects and transfers between projects. The work of the service is grouped under four general heads, as follows: Primary projects, those for which specific appropriations of funds are in effect and on which construction is under way; secondary projects, those for which general appropriations of funds have been made for all such work as a whole and on which only preliminary studies and surveys have been made to determine their advisability and practicability; Indian irrigation projects; and general accounts, which represent those expenditures that are general in nature and are not directly chargeable to any project when first incurred, but which become a charge against all projects as a part of the general or overhead expenses of the service.

Table 17 gives the voucher transactions and net investments of the United States on the several primary projects as of June 30, 1918; Table 18 gives the voucher transactions on secondary projects; and Table 19 gives the voucher transactions and net investment of the United States on Indian Irrigation projects and miscellaneous as of June 30, 1918. Table 21 shows the amount invested from the appropriation for increase in compensation for the fiscal year 1918.

TABLE 17.—*Voucher transactions and net investment of the United States on primary projects as of June 30, 1918.*

State and project.	Debits.			
	Disbursement vouchers.		Transfers received.	
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Arizona: Salt River	$233,356.06	$14,246,081.43	$17,687.34	$492,558.66
Arizona-California: Yuma	506,139.35	9,686,224.78	36,702.82	321,199.74
California: Orland	41,075.95	1,021,660.21	3,661.38	56,144.34
Colorado:				
Grand Valley	211,429.65	3,192,877.42	12,538.60	157,525.23
Uncompahgre	365,447.56	7,067,081.96	19,683.94	197,792.99
Idaho:				
Boise	340,144.14	12,788,918.90	19,443.27	483,109.77
King Hill	199,696.18	201,973.10	18,753.89	20,659.89
Minidoka	213,346.50	6,493,979.78	28,975.46	362,210.78
Kansas: Garden City	180.46	380,291.22	558.73	12,852.83
Montana:				
Huntley	159,033.71	2,096,963.56	14,277.55	111,161.26
Milk River	260,605.40	3,105,709.51	15,465.91	168,763.22
St. Mary storage	173,976.01	2,349,458.40	9,667.20	231,164.66
Sun River	220,615.12	3,511,889.10	13,923.13	188,584.37
Montana-North Dakota: Lower Yellowstone	31,145.08	3,370,731.89	3,902 21	110,733.11
Nebraska-Wyoming: North Platte	1,409,445.09	9,903,137.80	91,681.81	364,362.28
Nevada: Truckee-Carson	278,119.66	6,554,442.51	22,950.16	322,133.58
New Mexico:				
Carlsbad	162,922.15	1,586,410.90	8,774.11	71,176.29
Hondo		392,784.15	6.24	14,960.97
New Mexico-Texas: Rio Grande	1,043,207.54	7,254,836.58	55,971.66	415,524.76
North Dakota: North Dakota pumping	34,518.04	1,098,498.86	2,990.41	202,852.39
Oklahoma: Lawton	722.87	12,235.15	7.08	2,440.15
Oregon: Umatilla	86,358.20	2,733,517.10	7,409.77	97,250.44
Oregon-California: Klamath	150,550.52	3,199,715.05	9,676.73	105,854.29
South Dakota: Belle Fourche	73,283.40	3,901,511.01	5,857.94	112,174.18
Utah: Strawberry Valley	163,247.35	3,640,338.74	11,183.84	145,719.47
Washington:				
Okanogan	26,941.68	943,534.31	3,269.19	43,953.01
Yakima-Storage	962,634.89	3,673,821.86	73,258.67	330,065.54
Yakima-Sunnyside	239,786.69	4,182,874.00	19,149.06	91,698.55
Yakima-Tieton	59,511.84	3,385,917.72	13,181.42	483,574.06
Wyoming: Shoshone	508,734.30	5,714,677.88	27,286.77	235,453.11
Total	8,156,175.39	127,692,094.88	567,896.29	5,953,653.92

TABLE 17.—*Voucher transactions and net investment of the United States on primary projects as of June 30, 1918*—Continued.

State and project.	Credits.					
	Collection vouchers.					
	Water-right charges.				Miscellaneous.	
	Construction.		Operation and maintenance.		Fiscal year 1918.	To June 30, 1918.
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.		
Arizona: Salt River	$132,135.51	$232,135.51	$22,174.89	$22,174.89	$257,624.93	$4,079,475.96
Arizona-California: Yuma	20,301.30	296,914.22	28,748.83	107,963.23	153,213.70	647,548.27
California: Orland	21,312.06	39,099.72	25,077.83	25,077.83	2,159.41	136,670.68
Colorado:						
Grand Valley					41,459.73	75,025.30
Uncompahgre					133,225.58	730,348.56
Idaho:						
Boise	201,011.81	201,011.81			196,121.72	1,221,592.44
King Hill					4,180.34	4,180.34
Minidoka	285,068.75	786,480.96	192,417.80	576,602.91	[1] 119,860.64	434,953.49
Kansas: Garden City		142.50		104.50	38,155.71	42,753.18
Montana:						
Huntley	9,801.75	290,616.33	26,168.54	162,395.79	8,776.10	92,906.13
Milk River					26,894.70	73,295.20
St. Mary storage					6,874.37	64,590.84
Sun River	26,715.08	142,671.56	11,360.32	61,065.29	692.71	73,849.68
Montana - North Dakota: Lower Yellowstone	5,875.48	41,781.75	93.44	36,895.25	26,826.84	116,049.95
Nebraska-Wyoming: North Platte	149,703.85	656,342.42	117,256.87	551,675.96	20,945.99	165,272.57
Nevada: Truckee-Carson	27,102.19	341,926.53	50,011.42	284,376.67	30,340.65	193,978.66
New Mexico:						
Carlsbad	25,606.84	185,911.67	38,296.26	200,051.64	2,400.28	37,180.23
Hondo					24.00	34,641.67
New Mexico - Texas: Rio Grande					153,191.52	763,159.25
North Dakota: North Dakota Pumping	609.15	9,704.97	45.41	13,352.56	30,005.12	145,930.69
Oklahoma: Lawton						.20
Oregon: Umatilla	21,101.82	246,469.76	19,163.55	110,500.79	19,421.92	112,123.18
Oregon-California: Klamath	38,644.16	345,816.87	30,379.74	193,663.62	9,487.74	77,541.91
South Dakota: Belle Fourche	49,145.71	260,664.15	65,385.80	239,365.58	[1] 1,651.67	99,580.31
Utah: Strawberry Valley	34,470.06	82,829.38	17,605.24	36,681.81	41,366.87	276,345.32
Washington:						
Okanogan	7,628.19	32,310.38	9,390.47	46,483.91	11,202.87	113,405.17
Yakima-Storage	112,665.35	413,355.35	21,542.03	21,692.03	69,025.79	189,668.51
Yakima-Sunnyside	64,891.71	796,808.23	100,611.53	721,837.72	303.61	118,871.17
Yakima-Tieton	58,421.93	382,218.37	46,639.26	231,666.32	[1] 4,480.80	79,505.61
Wyoming: Shoshone	60,931.94	364,657.11	28,921.03	181,305.76	43,797.91	257,667.85
Total	1,353,144.64	6,149,869.55	851,290.26	3,824,934.06	1,201,727.00	10,458,112.32

[1] Deduct.

TABLE 17.—*Voucher transactions and net investment of the United States on primary projects as of June 30, 1918*—Continued.

State and project.	Credits.		Net investment of the United States.	
	Transfers issued.			
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Arizona: Salt River	$633.33	$67,352.98	[1] $161,525.26	$10,337,500.75
Arizona-California: Yuma	106.00	95,483.32	340,472.34	8,859,515.48
California: Orland	321.51	5,576.66	[1] 4,133.48	871,379.66
Colorado:				
Grand Valley	8,273.68	19,792.18	174,234.84	3,255,585.17
Uncompahgre	1,359.17	36,477.71	250,546.75	6,498,048.68
Idaho:				
Boise	42,631.18	181,888.75	[1] 80,177.30	11,667,535.67
King Hill	5,969.10	5,969.10	208,300.63	212,483.55
Minidoka	4,058.75	232,482.37	[1] 119,362.70	4,825,670.83
Kansas: Garden City	322.98	11,929.26	[1] 37,739.50	338,214.61
Montana:				
Huntley	1,651.44	162,209.89	126,913.43	1,499,996.68
Milk River	911.85	37,758.14	248,264.76	3,163,419.39
St Mary storage	1,057.76	56,174.70	175,711.08	2,459,857.52
Sun River	4,614.88	77,163.26	191,155.26	3,345,723.68
Montana-North Dakota: Lower Yellowstone	541.72	41,886.20	1,709.81	3,244,851.85
Nebraska-Wyoming: North Platte	1,010.99	29,021.54	1,212,209.20	8,865,187.59
Nevada: Truckee-Carson	2,129.04	53,230.35	191,486.52	6,003,063.88
New Mexico:				
Carlsbad	1,372.88	15,359.35	104,020.60	1,219,084.30
Hondo	....	1,000.76	[1] 17.76	372,102.69
New Mexico-Texas: Rio Grande	7,352.51	131,169.41	938,635.71	6,776,032.68
North Dakota: North Dakota pumping	4,308.80	187,716.96	2,539.97	944.646.07
Oklahoma: Lawton	277.93	876.93	452.02	13,798.17
Oregon: Umatilla	3,177.58	98,413.57	30,903.10	2,263,260.24
Oregon-California: Klamath	150.21	32,024.92	81,565.40	2,656,522.02
South Dakota: Belle Fourche	1,861.48	39,850.04	[1] 35,599.98	3,374,225.11
Utah: Strawberry Valley	3,974.64	58,198.13	77,014.38	3,332,003.57
Washington:				
Okanogan	407.00	11,432.41	1,582.34	783,855.45
Yakima-Storage	10,665.35	55,906.17	821,995.04	3,323,265.34
Yakima-Sunnyside	8,850.47	98,358.99	84,278.43	2,538,696.44
Yakima-Tieton	1,015.45	332,125.10	[1] 28,902.58	2,843,976.38
Wyoming: Shoshone	6,923.31	59,535.71	395,446.88	5,086,964.56
Total	125,930.99	2,236,364.86	5,191,978.79	110,976,468.01

[1] Deduct.

Table No. 18.—*Voucher transactions and net investment of the United States on secondary projects as of June 30, 1918.*

State and project.	Debits.			
	Disbursement vouchers.		Transfers received.	
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Arizona:				
Little Colorado		$9,515.33		$40.00
San Carlos		24,589.74		252.67
San Pedro		2,423.72		3.97
Arizona well drilling	$1,276.82	3,411.52	$60.00	60.00
Arizona-California:				
Colorado River		42,235.20		7,160.38
Colorado River Basin	13,748.14	123,451.23	3,236.16	16,001.75
California:				
Owens Valley		26,048.91		30.00
Sacramento Valley		52,808.13		2,748.07
San Joaquin		3,513.92		17.48
Iron Canyon cooperative	32.51	15,200.05	3.25	4,201.55
Pitt River cooperative		2,258.17		241.01
Shasta County cooperative		4,405.79		188.96
Lassen County cooperative		2,398.88		46.72
Imperial Valley	1,418.81	3,512.62	149.06	825.23
Kings River storage		768.60		389.10
Colorado: White River		4,348.04		9.11
Idaho:				
Dubois		21,464.03		858.13
Island Park	3,301.82	3,301.82	2,036.45	2,036.45
Port Neuf		2,165.77		2.24
General investigation		496.55	34.50	729.73
Swan Valley		544.48		.40
Montana:				
Clark Fork		5,417.71		433.67
Crow Reservation		21.029.47		5.01
Lake Basin		7,044.39		79.87
Madison River		10,795.45		2.57
Marias	1.50	14,063.96	6.82	116.71
Nebraska:				
South Platte		1,913.96		963.05
Nebraska investigations		3,350.94		42.76
North Platte cooperative	272.20	272.20	2.60	2.60
Pathfinder pumping		1,554.96		
Nevada: Walker River		13,643.22		53.15
New Mexico:				
La Plata		29,598.20		168.55
Las Vegas		5,012.16		2.23
Urton Lake		19,330.65		273.71
North Dakota:				
Bismark		16,709.04		26.69
Little Missouri		11,665.59		1,709.00
Nessen		7,491.51		29,786.35
Washburn		9,951.90		1,973.89
Bowman	5.50	3,654.96		1,512.97
Oklahoma:				
Cimarron		8,725.96		321.76
Red River		59,413.75		1,902.64
Oklahoma reconnoissance		400.00		
Turkey Creek		137.30		
Oregon:				
Malheur		82,592.87		4,312.28
Central Oregon		43,014.03		1,767.04
Columbia River cooperative		14,996.05		7,010.18
Oregon cooperative	[1] 13.83	46,797.43		11,691.10
South Dakota:				
Angostura	6,125.73	6,125.73	651.89	651.89
Teel district			456.35	456.35
Texas: Pecos River investigation		7,498.21	443.48	871.29
Utah:				
Bear Lake		18,859.06		30.72
Monmouth	184.60	184.60	219.67	219.67
Utah Lake		34,044.67		9.25
Provo Webber		141.35		
General investigation	1,634.62	1,634.62	125.70	125.70
Washington:				
Benton		11,167.45		
Kittitas	41.60	19,408.50		
Wapato		36,445.06		20.71
Palouse	16.00	76,805.20		130.19
Palouse cooperative		9,394.00		3,164 48
Priest Rapids		6,218.98		247.58
Wyoming:				
De Smet		9,053.32		2.51
Wyoming cooperative		3,177.31		529.20
Riverton	3,667.09	5,947.31	989.80	1,077.10
General investigation	5,122.35	5,122.35	1,206.14	1,206.14
Total	36,835.46	1,038,667.88	9,621.87	108,743.51

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[1] Deduct.

Table No. 18.—*Voucher transactions and net investment of the United States on secondary projects as of June 30, 1918*—Continued.

State and project.	Credits.				Net investment of the United States.	
	Collection vouchers.		Transfers issued.			
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Arizona:						
Little Colorado		$1.00				$9.554.33
San Carlos		12.90				24,829.51
San Pedro		.35				2,427.34
Arizona well drilling		1,446.01			$1,336.82	2,025.51
Arizona-California:						
Colorado River		760.32		$4,925.26		43,710.00
Colorado River Basin	$109.42	499.64	$926.26	3,107.34	15,948.62	135,846.00
California:						
Owens Valley		14,016.99				12,061.92
Sacramento Valley		91.79		11,843.69		43,620.72
San Joaquin		.20				3,531.29
Iron Canyon cooperative	750.64	9,796.07		540.96	[1] 714.88	9,064.57
Pitt River cooperative						2,499.18
Shasta County cooperative		2,450.00				2,144.75
Lassen County cooperative		500.00				1,945.60
Imperial Valley					1.567.87	4,337.85
Kings River storage						1,157.70
Colorado: White River		.15				4,357.00
Idaho:						
Dubois		1.81		5,068.29		17,252.06
Island Park			2,377.43	2,377.43	2,960.84	2,960.84
Port Neuf						2,168.01
General investigation					34.50	1,226.28
Swan Valley						544.88
Montana:						
Clark Fork		.25		269.90		5,581.23
Crow Reservation		1.90		2,120.62		18,911.96
Lake Basin				21.00		7,103.26
Madison River		1.85		67.08		10,729.09
Marias	3,546.56	3,588.11		632.20	[1] 3,538.24	9,960.36
Nebraska:						
South Platte						2,877.01
Nebraska investigations				12.00		3,381.70
North Platte cooperative					274.80	274.80
Pathfinder pumping						1,554.96
Nevada: Walker River						13,696.37
New Mexico:						
La Plata		1,702.42				28.064.33
Las Vegas		.30				5,014.09
Urton Lake		1,225.51		914.15		17,464.70
North Dakota:						
Bismrack		14.70		3,099.34		13,621.69
Little Missouri		1.25		1,439.82		11,933.52
Nesson		4.14		19,801.89		17,471.83
Washburn		42.83		1,350.68		10,532.73
Bowman	753.30	2,163.80		1,091.09	[1] 747.80	1,913.04
Oklahoma:						
Cimarron				156.55		8,891.17
Red River		161.77		945.35		60,209.27
Oklahoma reconnoissance						400.00
Turkey Creek						137.30
Oregon:						
Malheur		279.80		3,134.73		83,490.62
Central Oregon		1,353.58		3.081.08		40,346.41
Columbia River cooperative		218.12		4,779.60		17,008.51
Oregon cooperative	4,307.09	5,193.30		7,607.49	[1] 4,320.92	45,687.74
Teel district					456.35	456.35
South Dakota:						
Angostura	3,133.30	3,133.30	334.31	334.31	3,310.01	3,810.01
Texas: Pecos River investigation	1,486.50	1,515.05		782.00	[1] 1,043.02	6,072.45
Utah: Bear Lake		62.06				18,827.72
Monmouth					404.27	404.27
Utah Lake		4.62				34,049.30
Provo Webber						141.35
General investigation					1,760.32	1,760.32
Washington:						
Benton	31.20	156.00			[1] 31 20	11,011.45
Kittitas	814.98	814.98			[1] 773.38	18,593.52
Wapato						86,465.77
Palouse	1,672.05	1,798.43		400.00	[1] 1,656.05	74,736.96
Palouse cooperative		24.77		2,331.79		10,201.92
Priest Rapids		250.55				6,216.01
Wyoming:						
De Smet		39.55		98.90		8,917.38
Wyoming cooperative	1.25	24.75			[1] 1.25	3,681.76
Riverton	6,678.65	6,678.65	80.04	80.04	[1] 2,101.80	265.72
General investigation			22.40	22.40	6,306.09	6,306.09
Total	23,284.94	60,033.12	3,740.44	82,436.98	19,431.95	1,004,941.29

[1] Deduct.

Table 19.—*Voucher transactions and net investment of the United States on Indian irrigation and miscellaneous as of June 30, 1918.*

Item.	Debits.			
	Disbursement vouchers.		Transfers received.	
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Indian irrigation:				
Blackfeet project	$15.90	$926,149.07		$109,379.18
Flathead project	465.23	1,540,949.33		85,547.50
Fort Peck project	144.40	440,664.24		40,897.01
Total	625.53	2,907,762.64		235,823.69
Miscellaneous:				
General expense	479,968.93	4,236,417.27	$12,695.90	192,765.12
Preliminary investigation				80,488.73
Jackson Lake enlargement	18,202.91	741,636.20	388.10	103,822.35
Total	498,171.84	4,978,053.47	13,084.00	377,076.20

Item.	Credits.				Net investment.	
	Collection vouchers.		Transfers issued.			
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Indian irrigation:						
Blackfeet project		$950,909.15		$84,440.49	$15.90	$178.61
Flathead project	$3,811.03	1,581,075.96		46,594.33	[1] 3,345.80	[1] 1,173.46
Fort Peck project	86.53	465,246.14		16,188.60	57.87	126.51
Total	3,897.56	2,997,231.25		147,223.42	[1] 3,272.03	[1] 868.34
Miscellaneous:						
General expense	56,279.94	150,705.53	456,811.58	4,197,933.88	[1] 20,426.69	80,542.98
Preliminary investigation						80,488.73
Jackson Lake enlargement	30,812.22	843,218.61	4,119.15	11,338.18	[1] 16,340.36	[1] 9,098.24
Total	87,092.16	993,924.14	460,930.73	4,209,272.06	[1] 36,767.05	151,933.47

[1] Deduct.

Table 20.—*Recapitulation of voucher transactions and all net investments of the United States from the reclamation fund and Indian appropriations as of June 30, 1918.*

Item.	Debits.			
	Disbursement vouchers.		Transfers received.	
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Primary projects	$8,156,175.39	$127,692,094.88	$567,896.29	$5,953,653.92
Secondary projects	36,835.46	1,038,667.88	9,621.87	108,743.51
Indian irrigation	625.53	2,907,762.64		235,823.69
Miscellaneous	498,171.84	4,978,053.47	13,084.00	377,076.20
Total	8,691,808.22	136,616,578.87	590,602.16	6,675,297.32

TABLE 20.—*Recapitulation of voucher transactions and all net investments of the United States from the reclamation fund and Indian appropriations as of June 30, 1918*—Con.

Item.	Credits.			
	Collection vouchers.			
	Miscellaneous.		Water-right charges.	
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Primary projects	$1,201,727.00	$10,458,112.32	$2,204,434.90	$9,974,803.61
Secondary projects	23,284.94	60,033.12		
Indian irrigation	3,897.56	2,997,281.25		
Miscellaneous	87,092.16	993,924.14		
Total	1,316,001.66	14,509,300.83	2,204,434.90	9,974,803.61

Item.	Credits.		Net investment.	
	Transfers issued.			
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Primary projects	$125,930.99	$2,236,364.86	$5,191,978.79	$110,976,468.01
Secondary projects	3,740.44	82,436.98	19,431.95	1,004,941.29
Indian irrigation		147,223.42	[1] 3,272.03	[1] 868.34
Miscellaneous	460,930.73	4,209,272.06	[1] 36,767.05	151,933.47
Total	590,602.16	6,675,297.32	5,171,371.66	112,132,474.43

[1] Deduct.

TABLE 21.—*Investment, by projects, from the appropriation for increase of compensation, fiscal year 1918.*

Project.	Disbursement vouchers.	Transfers received.	Collection vouchers.	Transfers issued.	Net investment.
Salt River	$9,083.43	$407.14			$9,490.57
Yuma	19,163.17	671.85			19,835.02
Orland	1,962.50	96.07			2,058.57
Grand Valley	7,883.34	279.62	$43.36		8,119.60
Uncompahgre Valley	16,791.55	484.53	50.76		17,225.32
Boise	13,226.75	434.45	4.58		13,656.62
King Hill	4,879.40	167.06	6.42		5,040.04
Minidoka	7,320.44	340.31		$8.56	7,652.19
Garden City		8.89			8.89
Huntley	4,761.14	201.02			4,962.16
Milk River	4,931.98	197.00	22.61		5,106.37
St. Mary storage	8,380.00	265.34	.40		8,644.94
Sun River	9,753.61	314.80	1.20		10,067.21
Lower Yellowstone	1,285.92	92.17	1.28		1,376.81
North Platte	28,098.85	1,085.75			29,184.60
Truckee-Carson	8,676.78	383.42	15.73		9,044.47
Carlsbad	3,165.42	125.85	3.75		3,287.52
Rio Grande	32,980.12	1,036.73	10.08		34,006.77
North Dakota pumping	1,275.38	81.29	5.02		1,351.65
Umatilla	3,354.59	180.40			3,534.99
Klamath	5,504.42	214.98	25.44		5,693.96
Belle Fourche	3,655.80	137.70	1.75		3,791.75
Strawberry Valley	1,889.27	144.53			2,033.80
Okanogan	945.44	91.62			1,037.06
Yakima storage	51,852.83	1,491.43			53,344.26
Yakima Sunnyside	9,082.51	407.34			9,489.85
Yakima Tieton	3,492.54	128.37			3,620.91
Shoshone	15,825.08	511.72			16,336.80
Colorado River	191.03	15.00			206.03
Island Park	67.98	9.41			77.39
General investigations	122.05				122.05
Angostura	158.69	2.80			161.49
General investigations, Utah	3.76				3.76
Riverton	109.44	5.26	1.50		113.20
Blackfeet		42.89			42.89
Flathead		665.51			665.51
Fort Peck		87.22			87.22
General accounts	10,671.71		63.80	10,802.71	[1] 194.80
Total	290,546.92	10,809.47	257.68	10,811.27	290,287.44

[1] Deduct.

COLLECTIONS.

The two tables below give information as to collections that have been made under the reclamation operations. Table 22 gives an analysis of the sources of all cash collections to June 30, 1918, while Table 23 gives, by projects, the amount collected for water-right charges.

TABLE 22.—*Analysis of cash collections to June 30, 1918.*

Sources.	Fiscal years 1903-1917.	Fiscal year 1918.	Total to June 30, 1918.
Miscellaneous sales	$2,397,798.63	$409,941.35	$2,807,739.98
Miscellaneous services	4,613,190.05	35,805.87	4,648,995.92
Temporary water rentals	4,217,647.34	623,993.98	4,841,641.32
Power and light	1,503,516.97	223,594.16	1,727,111.13
Transportation refunds	338,424.02	19,772.91	358,196.93
Forfeitures by bidders and contractors	82,758.71	1,390.00	84,148.71
Water-right construction charges	4,796,724.91	1,353,144.64	6,149,869.55
Water-right operation and maintenance charges	2,973,643.80	851,290.26	3,824,934.06
Over disbursements	39,963.45	1,503.39	41,466.84
Total	20,963,667.88	3,520,436.56	24,484,104.44

TABLE 23.—*Collections of water-right charges by projects to June 30, 1918.*

State and project.	Construction charges.		Operation and maintenance.		Total.	
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.
Arizona: Salt River	$132,135.51	$232,135.51	$22,174.89	$22,174.89	$154,310.40	$254,310.40
Arizona-California: Yuma	20,301.30	296,914.22	28,748.83	107,963.23	49,050.13	404,877.45
California: Orland	21,312.06	39,099.72	25,077.83	25,077.83	46,389.89	64,177.55
Idaho:						
Boise	201,011.81	201,011.81	....	....	201,011.81	201,011.81
Minidoka	285,068.75	786,480.96	192,417.80	576,602.91	477,486.55	1,363,083.87
Kansas: Garden City	....	142.50	....	104.50	....	247.00
Montana:						
Huntley	9,801.75	290,616.33	26,168.54	162,395.79	25,970.29	453,012.12
Sun River	26.715.08	142,671.56	11,360.32	61,065.29	38,075.40	203,736.85
Montana-North Dakota: Lower Yellowstone	5,875.48	41,781.75	93.44	36,895.25	5,968.92	78,677.00
Nebrasia - Wyoming: North Platte	149,703.85	656,342.42	117,256.87	551,675.96	276,960.72	1,208,018.38
Nevada: Truckee-Carson	27,102.19	341,926.53	50,011.42	284,376.67	77,113.61	626,303.20
New Mexico: Carlsbad	25,606.84	185,911.67	38,296.26	200,051.64	63,903.10	385,963.31
North Dakota: North Dakota Pumping	609.15	9,704.97	45.41	13,352.56	654.56	23,057.53
Oregon: Umatilla	21,101.82	246,469.76	19,163.55	110,500.79	40,265.37	356,970.55
Oregon-California: Klamath	38,644.16	345,816.87	30,379.74	193,663.62	69,023.90	539,480.49
South Dakota: Belle Fourche	49,145.71	260,664.15	65,385.80	239,365.58	114,531.51	500,029.73
Utah: Strawberry Valley	34,470.06	82,829.38	17,605.24	36,681.81	52,075.30	119,511.19
Washington:						
Okanogan	7,628.19	32,310.38	9,390.47	46,483.91	17,018.66	78,794.29
Yakima, storage	112,665.35	413,355.35	21,542.03	21,692.03	134,207.38	435,047.38
Yakima, Sunnyside	64,891.71	796,808.23	100,611.53	721,837.72	165,503.24	1,518,645.95
Yakima, Tieton	58,421.93	382,218.37	46,639.26	231,666.32	105,061.19	613,884.69
Wyoming: Shoshone	60,931.94	364,657.11	28,921.03	181,305.76	89,852.97	545,962.87
Total	1,353,144.64	6,149,869.55	851,290.26	3,824,934.06	2,204,434.90	9,974,803.61

Table 23.—*Collections of water-right charges by projects to June 30, 1918*—Continued.

State and project.	Refunds.						Net collection of water-right charges to June 30, 1918.
	Construction charges.		Operation and maintenance charges.		Total.		
	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.	Fiscal year 1918.	To June 30, 1918.	
Arizona: Salt River							$254,310.40
Arizona-California: Yuma							404,877.45
California: Orland							64,177.55
Idaho:							
Boise							201,011.81
Minidoka	$143.40	$377.50	$88.00	$106.00	$231.40	$483.50	1,362,600.37
Kansas: Garden City		142.50		104.50		247.00	
Montana:							
Huntley	106.20	709.79		96.97	106.20	806.76	452,205.36
Sun River		755.85		125.97		881.82	202,855.03
Montana-North Dakota: Lower Yellowstone							78,677.00
Nebraska-Wyoming: North Platte	[1] 246.85	441.29	246.85	271.25		712.54	1,207,305.84
Nevada: Truckee-Carson	85.00	295.00		42.00	85.00	337.00	625,966.20
New Mexico: Carlsbad							385,963.31
North Dakota: North Dakota Pumping		129.20		23.80		153.00	22,904.53
Oregon: Umatilla		63.00		9.55		72.55	356,898.00
Oregon-California: Klamath		1,427.50		60.75		1,488.25	537,992.24
South Dakota: Belle Fourche		260.00		5.87		265.87	499,763.86
Utah: Strawberry Valley							119,511.19
Washington:							
Okanogan				52.50		52.50	78,741.79
Yakima, storage							435,047.38
Yakima, Sunnyside	[1] 17.11	2,071.02	432.95	975.40	415.84	3,046.42	1,515,599.53
Yakima, Tieton		768.60				768.60	613,116.09
Wyoming: Shoshone		1,187.52		257.02		1,444.54	544,518.33
Total	70.64	8,628.77	767.80	2,131.58	838.44	10,760.35	9,964,043.26

[1] Deduct.

RIO GRANDE DAM APPROPRIATION.

The three tables that follow give for the Rio Grande Dam appropriation information similar to that appearing in Tables 13 to 16, inclusive, with corresponding titles for the reclamation fund:

Table 24.—*Special appropriation for Rio Grande (Elephant Butte) Dam (34 Stat., 1357) to June 30, 1918.*

	Debit.	Credit.
Appropriation warrant No. 79, Mar. 4, 1907		$1,000,000.00
Disbursements, 2,896 vouchers	$1,000,091.78	
Collections, 24 vouchers		91.78
Total	1,000,091.78	1,000,091.78

TABLE 25.—*Balances of appropriations for Rio Grande (Elephant Butte) Dam with Treasurer of the United States, June 30, 1907, to June 30, 1918.*

Fiscal year.	Appropriation.	Withdrawals.	Balances.
1907	$1,000,000.00		$1,000,000.00
1908		$33,113.21	966,886.79
1909		137,074.22	829,812.57
1910		247,217.23	582,595.34
1911		327,875.96	254,719.38
1912		214,052.49	40,666.89
1913		39,165.89	1,501.00
1914		1,501.00	
Total	1,000,000.00	1,000,000.00	

TABLE 26.—*Disbursement and collection vouchers, appropriation for Rio Grande (Elephant Butte) Dam, paid and collected to June 30, 1918.*

Fiscal year.	Disbursement vouchers.		Collection vouchers.	
	Number.	Amount.	Number.	Amount.
Balance from Twelfth Annual Report	2,895	$998,590.78	24	$91.78
June 30, 1915	1	1,501.00		
Total	2,896	1,000,091.78	24	91.78

DISCUSSION OF PROJECTS.

PRIMARY PROJECTS.

(For detailed tables on cement, unit bids and contract prices, engineering data for projects on completion, summary of results to June 30, 1918, crops, finances, etc., see appendix.)

ARIZONA, SALT RIVER PROJECT.

(Project turned over to water users on Nov. 1, 1917.)

W. R. Elliott, Salt River Valley Water Users' Association, project manager, Phoenix, Ariz.[1]

LOCATION.

Counties: Maricopa and Gila.

Townships: 2 S. to 3 N., Rs. 1 to 6 E. and 1 W., and Tps. 3 to 5 N., Rs. 11 to 14 E., Gila and Salt River base and meridian.

Railroads: Santa Fe, Prescott & Phoenix; Arizona Eastern.

Railroad stations and other towns, showing estimated population June 30, 1918; Phoenix, 25,000; Mesa, 3,000; Glendale, 1,200; Tempe, 2,000; Chandler, 600; Peoria, 300; Gilbert, 50; Scottsdale, 50; Higley, Lehi, Tolleson, Alhambra, Cashion, and Laveen, each about 25.

WATER SUPPLY.

Source of water supply: Salt and Verde Rivers and wells in various parts of the valley.

Area of drainage basins at Granite Reef Dam: Salt River, 6,250 square miles; Verde River, 6,000 square miles.

Annual run-off in acre-feet: Salt River at Roosevelt (5,760 square miles), 1889 to 1916, maximum 3,226,000, minimum 153,394, mean 865,853; Verde River at McDowell (6,000 square miles), 1889 to 1916, maximum 1,822,000, minimum 116,679, mean 560,560.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which works are prepared to supply water, season of 1918: 192,077 acres, entitled to permanent water, including private, homestead, and school lands, and townsites; and 20,889 acres entitled to temporary water service.

Area under rental contracts, season of 1918: 201,601 acres (on October 31, 1917).

Length of irrigating season: 365 days, October 1 to September 30.

Rainfall on irrigable area: 33-year period, average, approximately 8 inches. Calendar year 1917, 10 months, 9.6 inches.

Average elevation of irrigable area: 1,200 feet above sea level.

Range of temperature on irrigable area: 22° to 117° F.

Character of soil of irrigable area: Sandy loam, with clay in places.

Principal products: Alfalfa, grain, cotton, olives, citrus and deciduous fruits, and live stock.

Principal markets: Phoenix and other Arizona towns, Pacific coast cities, and eastern markets.

LANDS OPENED FOR IRRIGATION.

Public notices. January 18, May 19, 1917, August 8, 1917.

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[1] William S. Cone and Walter Ward, project managers to November 1, 1917, when project was turned over to the water users.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun: 1902.
Construction recommended by the director: March 7, 1903.
Construction conditionally authorized by the Secretary: March 14, 1903.
Grand, Water Power, Salt River Valley, Maricopa, and Joint Head Canals purchased: June 15, 1906.
Intake Dam for Power Canal completed: October, 1906.
Power Canal completed: October, 1906.
Irrigation by the Reclamation Service begun: May 15, 1907.
Granite Reef Dam completed: August, 1908.
South Canal completed: June, 1909.
Eastern Canal completed: December, 1909.
Roosevelt Dam completed: February 5, 1911; formal dedication, March 18,1911.
San Francisco pumping plant completed: October, 1911.
South-Consolidated power plant, operation commenced: October 23, 1912.
Arizona Falls power plant, operation commenced: May, 1913.
Western Canal completed and operation commenced: February 16, 1913.
Mesa District pumping plants (Batteries A, B, C, D, E, F), drilling commenced: December, 1908; final installation completed, June, 1913.
Highline pumping plant put in operation: June, 1913.
Highline Canal completed and operation commenced: June 16, 1913.
Raising of spillways, Roosevelt Dam, completed: August, 1913.
Joint Head Dam completed: March, 1914.
Reconstruction of the Arizona Canal completed: February, 1915.
McQueen pumping plant completed: March, 1915.
Farm unit survey completed: April, 1915.
Water over spillways of Roosevelt Reservoir: April 14, 1915; January–May, 1916.
Survey for silt deposit in Roosevelt Reservoir: June, 1915.
South Side Canal system completed: June, 1915.
Installation of sixth unit, Roosevelt power plant, completed: November, 1915.
Cross Cut power plant completed: December, 1915.
Project turned over to water users: November 1, 1917.
Project 100 per cent completed: June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Salt River project provides for the storage of water in the reservoir created by the building of the Roosevelt Dam, which is situated at the confluence of Tonto Creek and Salt River, about 70 miles northeast of Phoenix, Ariz. This stored water is carried down Salt River to a point about 4 miles below the mouth of the Verde River, where, together with such water as may be discharged by the Verde, it is diverted to the North and South side canal systems by the Granite Reef Diversion Dam. The water supply for the canals on the north side of the river is further augmented by the water diverted by the Joint Head Diversion Dam.

There have been completed and put into operation nine pumping plants with an approximate capacity each of 10 second-feet. A pumping plant located at the junction of the Western Canal and the Kyrene branch pumps water through a 54-inch pressure pipe 5,930 feet long to an elevation of 40 feet and waters approximately 7,500 acres of land. The United States claims all waste, seepage, unappropriated springs, and percolating water arising within the project, and proposes to use such water in connection therewith.

The canal and lateral system at present comprises 815.5 miles, and on completion of the project provides for the delivery of water to each 160-acre tract of irrigable land.

A power plant located at Roosevelt generates power from stored water in the reservoir and from water delivered from the Power Canal, heading at a diversion dam in Salt River, 19 miles above the storage dam. Three other power plants have been constructed by the water users' association and have become a part of the project, viz, the South-Consolidated, the Arizona Falls, and the Cross Cut. A portion of the power developed will be used for pumping water for irrigation and the remainder for industrial purposes.

The principal features are the Intake Dam and Power Canal, the Roosevelt Dam, Granite Reef Dam, Joint Head Dam, the main canals of the distributing system and the greater part of the lateral system, and the power system, comprising four power plants, transformer house, transmission lines, switching station, and four substations. Some work remains to be done on the sluicing tunnel through the Roosevelt Dam, and rather extensive repairs and now needed on the Intake Dam and Granite Reef Dam.

SUMMARY OF GENERAL DATA FOR SALT RIVER PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:			
Irrigable acreage when project is complete			192,077
Public land entered to end of fiscal year		16,170	
State land		11,030	
Private land		164,877	
Acreage Service could have supplied season of 1917			[1] 212,966
Acreage actually irrigated, season of 1917			201,600
Acreage cropped under irrigation, season of 1917			188,500
Crops:			
Value of irrigated crops, season of 1917			$13,692,000.00
Value of irrigated crops, per acre cropped			72.60
Finances:			
Net construction cost to end of fiscal year			$11,541,507.38
Per cent complete at end of fiscal year			100
Appropriated for fiscal year 1919, total			$797,000.00
Proposed appropriation, fiscal year 1920			$1,000.00
Appropriation, fiscal year 1918			$458,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$234,400.03		
Transfers	16,771.56		
		$251,171.59	
Unincumbered balance, July 1, 1918			206,828.41
Repayments:			
Value of construction water-right contracts			10,166,021.97
Construction charges—			
Accrued to end of fiscal year			232,167.19
Collected to end of fiscal year			232,167.19
[2] Water-rental charges—			
Accrued to end of fiscal year			2,278,309.26
Collected to end of fiscal year			2,278,309.26
[2] Power earnings—			
Accrued to end of fiscal year			1,029,254.08
Collected to end of fiscal year			1,029,254.08
Drainage: Cost of drainage works to end of fiscal year			7,673.05

SALT RIVER PROJECT TURNED OVER TO WATER USERS.

A notable event in the history of the Salt River project, Arizona, and of the Government's operations under the reclamation law generally, took place on November 1, when the works of that project were turned over to the water users to operate and maintain for themselves. The project system as planned by the Reclamation Service had been practically completed for some time, and on January 18, 1917, the Secretary of the Interior issued the public notice called for by section 4 of the reclamation act, announcing construction charges, irrigable lands, etc. Meanwhile there had been considerable discussion looking to a transfer of control to the irrigators' own organization, the Salt River Valley Water Users' Association. This was in line with the policy of Secretary Lane, so that it was necessary only to agree on details. The association was represented in the preliminaries by its president, John P. Orme, and counsel, Joseph H.

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[1] Includes 20,889 acres entitled to temporary water service.

[2] All uncollected and unpaid items assumed by Salt River Water Users' Association when project was turned over under the provisions of contract dated Sept. 6, 1917.

Kibby, former governor of Arizona. The negotiations resulted in a contract of September 6, 1917, between the association and the United States, "acting in this behalf by the Secretary of the Interior."

Under this agreement the association assumes full management of the project works, including outstanding obligations and contracts, and repays the construction cost in 20 annual installments of 2, 4, and 6 per cent, following section 2 of the reclamation extension act. The first payment was due December 1, 1917. The association receives all income arising from operation and agrees to maintain the works in as good and efficient condition as when taken over, excepting only the depletion of storage capacity by natural silting and injury by public enemies or by the United States as a war measure, which shall suspend or postpone repayments. To secure proper maintenance the works are subject to inspection under the direction of the Secretary of the Interior, and his prior written consent is necessary before making any substantial change in the works. The association agrees to cooperate in providing water for the Salt River Indians, in accordance with the act of May 19, 1916. The proper representative of the United States may inspect the records of the association, which has similar rights respecting Reclamation Service records. The association holds the United States harmless as to damages arising from operation and maintenance. It must operate in accordance with the requirements of law as well as the rules and regulations, past and future, issued thereunder by the Secretary of the Interior, and will use its powers to enforce these. Water must be delivered to each farm or as near each farm as at present, and the association will use all practical methods to insure economical and beneficial use of water. It must keep records of water deliveries and crops grown on the project. The association may terminate the agreement on March 1 of any year by written notice a year before. The Secretary of the Interior may terminate it at any time the association fails to carry it out or if he reasonably believes the security for the Government's investment is being impaired.

The Salt River project is one of the most successful in this country. The works include the famous Roosevelt Dam, providing a storage capacity of over 1,300,000 acre-feet, Granite Reef and Joint Head Diversion Dams, and over 800 miles of canals. The power possibilities made available by the irrigation works have been developed by several hydroelectric plants and transmission lines. The net cost of the works on June 30, 1917, was something over ten and one-half million dollars. During that year the works delivered water to about 200,000 acres, from which crops were harvested with a value estimated at $13,692,000, or substantially more than the total cost of the project.

A census of the project on October 1, 1917, shows on the farms live stock and equipment worth $8,500,000, a gain of more than $500,000 during the preceding year.

CONSTRUCTION DURING FISCAL YEAR (TO OCT. 31, 1917).

Spillways.—In order to obtain a more uniform distribution of water in the upper north spillway channel, guide walls were constructed through the center and the south half of the spillway crest was raised one foot. This work was all completed before the spring floods of 1917 and during that period the water overtopped this spillway to a depth of about 18 inches. The results indicate that the guide walls are going to operate satisfactorily.

The concrete construction at the foot of the north spillway cliff was subjected to the 1917 overflow and the regular discharge of the north outlet tunnel during the 1917 season and is in good condition.

Concrete facing in the south spillway channel was completed.

North outlet tunnel.—In order to control the discharge from the north outlet tunnel, a new tunnel connection was started on the south face of the north abutment cliff, to tap the present tunnel at a point immediately below the end of the pipes leading from the balanced valves. The excavation for the connecting tunnel and operating chamber is 75 per cent completed, and all of the material, with the exception of the needle valves which are to control the discharge from the reservoir, was on the ground November 1.

Power canal penstock connection.—The pipe line and tunnel connection between the two pipe lines in the sluicing tunnel and the 7-foot power canal penstock was completed in October, 1917.

Power house.—Work on the 2-story 18 by 17 foot concrete warehouse at the north end of the power house was completed.

Granite reef dam.—The spring floods of 1917 washed a large hole at the end of the apron and threatened to undermine the cut-off wall of the sluiceway at Granite Reef Dam. Repairs were made by filling with large wire sacks full of bowlders which will probably prevent further damage being done.

Sluiceway at North Consolidated power house.—A new apron and cut-off wall were built extending 17½ feet downstream from the old cut-off. The new cut-off wall rests on bedrock for the west 20 feet, and for the remaining 60 feet extends 10 feet in depth into the river gravel.

Consolidated canal.—Three additional jetties were built at a point below the South Consolidated power plant.

Joint Head Dam.—Work of resurfacing the apron with concrete was 75 per cent completed November 1, 1917. The necessary equipment was on the ground for construction of another apron (30 by 120 feet) and cut-off immediately below the present apron.

Grand canal.—Three rock and brush jetties were constructed at a point immediately east of the wasteway from the Grand Canal into the Salt River.

Goldfield-Superior transmission line.—On November 1, 1917, construction work had progressed as follows: Conductors strung to pole No. 180; poles erected to pole No. 220; holes dug to pole No. 590; all material received with exception of one carload of poles in transit; machinery for the power plant contracted for with the Magma Copper Company.

SEEPAGE AND DRAINAGE.

No drainage construction has been done by the Reclamation Service, but investigations have been made to ascertain the groundwater conditions on the portions of the project where the indications are that drains will have to be provided in the near future. The reading of wells was continued to November, 1917.

OPERATION OF POWER SYSTEM.

The Roosevelt power plant was operated continuously to November 1, 1917. Units 1, 2, and 3 were not operated during this period due to the power canal not being in service and the 7-foot penstock and sluiceway tunnel not being completed. New runners, gates, and draft tubes were purchased to convert units 1, 2, and 3 into variable-head machines to operate on the reservoir head. A 100-kilowatt motor generator exciter set was installed. A Tirrill voltage regulator was received but the installation was not completed. A new discharge pipe for the synchronous by-pass valve on the sixth unit was installed.

The Cross Cut plant was operated continuously with the exception of the period from January 16 to February 1, when the Arizona Canal was being cleaned. New pins, babbitt bushings, and C. I. deflector shoes were installed on No. 2 exciter. A new set of steel gears was installed on No. 1 governor oil pump. A new 2-inch centrifugal pump for pumping transformer cooling water was installed. Grounding switches were placed on each of the 875 K. V. A. generators. A curve-drawing frequency meter was added to the switchboard and the transformers were cleaned.

The South Consolidated plant was operated as required during the year. From January 25 to 30 the plant was shut down due to cleaning of the South Canal. From August 1 to 31 the plant was not operated as power was not required. The commutators on both exciters were ground true.

The Arizona Falls plant was operated as continuously as the flow of water in the Arizona Canal would permit. The commutators on both exciters were ground true.

The transmission lines were in continuous service during the year. The operation of the 45,000-volt lines was excellent. The 11,000-volt lines in the Chandler district suffered severely during the lightning season.

The substations were all in service throughout the year. Numerous repairs were necessary and all apparatus was cleaned and overhauled.

OPERATION AND MAINTENANCE.

There was a plentiful supply of water during the entire year for all lands under the project including those lands entitled to temporary service only. On October 31 there were 201,601 acres under water-service contracts comprising 4,367 water-rental applications. All of the features were operated and maintained practically the same as during the fiscal year 1917, there being no extensions to the project, with the exception of approximately 5½ miles of laterals, making a total of 821 miles of canal and lateral on the entire project.

The Roosevelt reservoir conditions for the period from July 1 to October 31 are summarized as follows:

Date.	Elevation of water surface.	Contents in acre-feet.
July 1 (highest during period)	219.07	1,269,019
October 31 (lowest during period)	194.52	902,226
Net loss	24.55	366,793

Amount drawn during period, 369,669 acre-feet.

The principal maintenance work consisted of ordinary repairs and upkeep of structures, the removal of sand and silt from the bottoms of ditches, and the removal of weed growth from the canal banks. Several flocks of sheep and goats were kept on the canals during this period and did good work in keeping down the weed growth.

Historical review, Salt River project.

	1913	1914	1915	1916	To Sept. 30, 1917.
Acreage for which service was prepared to supply water	190,000	187,112	192,000	[1] 212,960	[1] 212,966
Acreage irrigated	163,312	187,112	192,000	187,905	201,600
Miles of canal operated	715	715	782.6	806.25	821
Water diverted (acre-feet)	770,063	804,924	831,438	996,600	1,062,352
Water delivered to land (acre-feet)	462,037	446,730	498,862	677,688	537,511
Per acre of land irrigated (acre-feet)	2.97	2.62	2.66	3.58	2.67

[1] Includes 20,889 acres entitled to temporary service only.

SETTLEMENT.

Settlement data, Salt River project.

Items.	1913	1914	1915	1916	1917
Total number of farms on project	2,680	3,068	3,600	3,004	[1] 4,284
Population	20,000	20,500	22,000	22,000	22,000
Number of irrigated farms	2,680	3,068	3,600	3,004	4,284
Operated by owners or managers	1,945	2,459	2,700	2,333	2,570
Operated by tenants	735	609	900	671	1,714
Population	20,000	20,500	22,000	22,000	22,000
Number of towns	11	11	12	12	14
Population	26,600	30,500	31,000	31,000	32,350
Total populations in towns and on farms	46,600	51,000	53,000	53,000	54,350
Number of public schools	52	60	60	60	60
Number of churches	48	50	50	50	50
Number of banks	11	11	12	10	11
Total capital stock	$925,100	$798,500	$828,500	$1,333,500	$1,162,000
Amount of deposits	$7,986,234	$8,353,519	$9,000,000	$7,189,265	$10,368,619

[1] Shown as number of water-rental applications instead of land owners as in previous years.

PRINCIPAL CROPS.

The crop yields have been good and prices above normal, making the year an exceptionally prosperous one. The total gross value of the crops produced was $13,692,000, an average of $72.60 per acre cropped. Owing to the high prices received for cotton in 1916 the area cropped in 1917 was increased from 6,000 to over 23,000 acres.

Crop report, Salt River project, Arizona, agricultural year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	67,865	Ton	285,030	4.2	$15.00	$4,275,450	$63.00
Alfalfa seed	100	Pounds	13,000	130	.13	1,690	16.90
Grain, hay	2,443	Ton	4,642	1.9	14.00	64,988	26.60
Corn, Indian	1,851	Hundredweight	33,318	18	2.00	66,636	36.00
Corn, fodder	1,031	Ton	5,362	5.2	25.00	134,060	130.00
Corn, sorghum	25,471	do	28,018	1.1	45.00	1,260,810	49.50
Corn, broom	317	do	79	.25	100.00	7,900	25.00
Cane, sugar	69	do	172	2.5	25.00	4,300	62.50
Barley	9,309	Hundredweight	153,606	16.5	2.75	422,416	45.37
Wheat	3,794	do	53,123	14	3.00	159,369	42.00
Oats	900	do	15,759	17.5	2.50	39,395	43.75
Cotton, long staple	23,445	Hundredweight	58,610	2.5	75.00	4,395,750	187.50
Cotton, seed		Ton	8,205	.35	60.00	492,300	21.00
Oranges, navel	797	Crate	80,522	101	3.00	241,566	303.00
Oranges, Valencia	35	do	3,150	90	3.25	10,232	292.50
Grapefruit	135	do	7,506	55.5	2.75	20,641	152.63
Olives	131	Pounds	464,580	3,560	.03	13,900	106.80
Apricots	341	do	2,046,500	6,000	.02½	51,162	150.00
Peaches	595	do	3,336,760	5,600	.02	66,735	112.00
Pears	91	do	118,733	1,300	.03	3,560	39.00
Grapes	177	do	264,750	1,500	.02½	6,618	37.50
Small fruit	154	Crate	76,875	500	1.00	76,875	500.00
Cantaloupes	2,906	do	435,862	150	1.00	435,862	150.00
Watermelons	427	Pound	2,217,800	5,200	.01	22,178	52.00
Lettuce	146	Crate	29,300	200	.90	26,370	180.00
Garden	901					67,575	75.00
Beans	1,425	Hundredweight	21,375	15	9.00	192,375	135.00
Pasture	53,222					1,064,444	20.00
Potatoes, Irish	373	Hundredweight	22,380	60	2.25	50,353	135.00
Potatoes, sweet	69	do	8,250	120	2.00	16,500	240.00
Grand total	198,520						
Less duplicated areas	10,020						
Total cropped	188,500	Total and average				13,692,000	72.60

		Areas.	Acres.	Farms.
Irrigated, no crop:		Total irrigated area farm reported	193,695	[1] 4,326
Miscellaneous (houses, yards, etc.)	4,448	Farmed by owner		2,539
Nonbearing orchard	5,748	Farmed by tenants		1,787
Townsites	4,902	Total cropped area farms reported	183,500	4,326
Vacant land	3,002			
Less duplicated area	5,000			
Total irrigated	201,600			

[1] Number of water rental applications.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, AUGUST 8, 1917.

1. **Amendment of public notice of January 18, 1917.**—Sections 6, 10, and 16 of the public notice issued for the Salt River project, Arizona, January 18, 1917, are hereby amended to read as follows:

"6. The water-right charges for said lands shall be of two kinds (*a*) a charge of $60 per irrigable acre for the building of the irrigation system, termed the construction charge, the installments being due and payable as herein provided; and (*b*) an annual charge for operation and maintenance, the minimum charge therefor being due and payable in advance on October 1 of each year. The minimum operation and maintenance charge for the irrigation year beginning

October 1, 1917, and ending September 30, 1918, shall be due on October 1, 1917, and shall be 75 cents for each acre of irrigable land whether irrigated or not, and for such minimum charge there may be delivered not to exceed 1 acre-foot of water per acre. For each acre-foot of water per acre furnished in addition, a charge of 75 cents per acre-foot shall be made. The charges for the additional water shall be due and payable in advance. The operation and maintenance charges for future years will be duly announced.

"10. For all lands under the high line canal the water is delivered by pumping and said lands shall be subject to payment, in addition to the usual charges for water served to lands by gravity, of the annual charges for operation and maintenance of the high line pumping plant and all appurtenances, including the actual cost of power used by said plant without interest on investment, as hereafter announced. Additional charges on account of the operation and maintenance of the high line pumping plant shall be due and payable on December 1 of each year following the end of the irrigation season.

"16. Until further notice, flood waters as classified under the rules hereinafter stated will, after September 30, 1917, be delivered at the same rates as are fixed for operation and maintenance charges for the same irrigation year, except that 1 acre-foot only will be charged for each 2 acre-feet delivered. The term flood waters as here used is defined as any flow in the Rio Verde in excess of the following: During December and January 800 second-feet, during February, March, and November 1,200 second-feet, and from April 1 to October 31, both inclusive, 1,600 second-feet. The said charges for the delivery of flood waters shall apply only to lands for which water-right application has been duly made."

FRANKLIN K. LANE,
Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Salt River project, Nov. 1, 1917, date project was turned over to Salt River Valley Water Users Association.

Inventory of stock on hand			$160,503.29
Accounts receivable			9,346,479.19
Construction work contracted			39,570.00
Construction cost		$14,938,399.74	
Less construction revenue earnings	$2,398,481.33		
Less power earnings	998,411.03		
		3,396,892.36	
			11,541,507.38
Total			21,088,059.86
Accounts payable			73,718.71
Contingent obligations			39,570.00
Reserves for repayment to reclamation fund of cost of project			10,629,837.96
Capital investment:			
Disbursement, transfer, and joint construction vouchers received		16,151,058.32	
Collection, transfer, refund, and joint construction vouchers issued		5,806,125.13	
Net investment			10,344,933.19
Total			21,088,059.86

Feature costs of Salt River project, June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examinations and surveys		$83,939.83
Storage works, Roosevelt Reservoir:		
Roosevelt Dam		3,210,748.53
Roosevelt Reservoir		168,341.94
Spillways	$49.84	149,560.18
Sluicing tunnels		74,794.93
New sluicing tunnel (June 30, 1915)		29,073.53
Sluicing tunnel repairs	75.28	37,498.70
Hydraulic gates		249,841.27
Repairs to tunnels and gates		49,600.63
Overflow weir		8,966.55
Outlet tunnel		58,429.18
North outlet tunnel	9,009.48	37,939.68
South sluicing tunnel below 7-foot penstock	17,157.13	17,157.13
Total storage works	26,291.73	4,091,952.25
Pumping for irrigation:		
Battery A		16,425.49
Battery B		20,603.87
Battery C		16,734.94
Battery D		19,358.12
Battery E		21,848.29
Battery F		16,808.09
Clemans's wells		8,124.41
San Francisco		29,978.98
McQueen		17,245.44
Test wells		178.75
Total pumping for irrigation		167,306.38
Canal system:		
Granite Reef Dam		627,057.66
Joint Head Dam		39,528.93
Arizona Canal		806,301.63
Grand Canal		233,344.07
Appropriators canal		11,275.57
South Canal		183,081.61
Eastern Canal		132,545.68
Consolidated canal		188,944.19
East Branch Consolidated Canal		49,763.00
Main Consolidated		35,718.91
Mesa Canal		43,000.00
Tempe Canal		7,813.85
San Francisco Canal		12,891.00
Eureka Canal		9,269.00
Cross-Cut Canal,	162,282.86	162,282.86
Grand Canal extension	87,116.07	87,116.07
Grand Canal enlargement	37,846.82	37,846.82
High line canal	98,536.97	98,536.97
Western Canal	48,735.20	48,735.20
Total canal system	434,517.92	2,815,053.02
Lateral system	721.29	620,071.25
Drainage investigations	512.18	7,673.05
Power system:		
Diversion dam		127,353.22
Power canal		1,291,727.34
Penstock tunnel and auxiliary penstock		81,378.45
Power house No.1, installing machinery		182,010.02
Power house No. 1, sixth unit		72,319.97
Hydroelectric power plant No. 1		148,488.52
Transmission line branch, power house No. 2		892.90
Hydroelectric plant No. 5		66.00
Transmission line from Arizona Falls River plant to power plant No. 3		341.30
Power house No. 2, clear-water supply		1,016.55
Penstock Dam		100,957.22
Transformer house, Roosevelt building and machinery		136,731.41
Inspiration Consolidated Copper Co		3,960.08
Mesa Roosevelt transmission line reconstruction		119,609.95
Transmission line 40,000-volt		335,770.49
Secondary transmission line, Glendale		13,159.36
Switching station, buildings and betterments		39,102.49
Substation No. 1, buildings and miscellaneous		32,560.76
Secondary transmission line and extension, Mesa		52,043.88
Phoenix power substation		14,600.20
Secondary transmission line, Phoenix		9,232.46

Feature costs of Salt River project, June 30, 1918—Continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Power system—Continued.		
Glendale substation		$8,318.30
High line transmission line		231.56
Granite Reef diversion dam transmission line		2,886.21
McQueen well transmission line		5,700.60
Transmission line to consolidated canal substation		111.27
Roosevelt-Miami transmission line		204,094.58
Arizona Falls power plant		109,500.73
South consolidated power plant		162,123.05
Cross Cut power plant		480,454.68
Sixth unit (central station)		41,451.70
Protective wall, south spillway	$767.93	28,094.59
Connection with 7-foot penstock	5,783.10	39,859.62
Excavation river channel	32.07	46,592.40
Power-station storehouse	5,735.02	8,586.30
Electric machinery	5,763.29	5,787.29
Transmission line	279.48	279.48
Arizona Falls transmission line	9,228.18	9,228.18
South Canal transmission line	21,598.28	21,598.28
Additional cost on Cross-Cut power house	9,864.95	9,864.95
Total power system	59,052.30	3,948,066.34
Farm units	124.36	31,062.53
Permanent improvements and lands:		
Lands not submerged by reservoir		37,642.90
Roads		620,942.14
Buildings and grounds		105,101.13
Total permanent improvements		763,686.17
Telephone system		69,734.13
Operation and maintenance during construction (rental basis)	38,037.25	2,362,719.51
Plant accounts	[1] 39,453.31	
Unadjusted clearing accounts	[2] 22,278.45	[2] 22,864.72
Gross construction cost to June 30, 1918	497,525.27	14,938,399.74
Less revenues earned during construction period:		
Rentals of buildings	1,047.34	20,575.22
Rentals of grazing and farming lands	57.00	19,373.14
Rentals of irrigation water [3]	289,319.53	2,319,546.04
Contractors' freight refunds		21,180.85
Other revenues, unclassified		17,806.08
Net power earnings (prior to public notice)	355,973.42	998,411.03
Total revenues	646,397.29	3,396,892.36
Net cost of construction of project to June 30, 1918		11,541,507.38

[1] Deduct.
[2] Deduct. Net results on mess houses, mercantile stores, hospitals, and other operations.
[3] Includes $41,236.78 rentals of water for power purposes.

Cost statement by calendar years, Salt River project.

Year ending Dec. 31—	Construction.	Operation and maintenance during construction.	Total cost.
1905	$1,980,802.31		$1,980,802.31
1906	1,070,221.39		1,070,221.39
1907	1,393,460.43	$45,302.29	1,438,762.72
1908	1,917,586.34	70,663.13	1,988,249.47
1909	1,854,324.20	91,877.65	1,946,201.85
1910	748,299.49	171,541.52	919,841.01
1911	623,518.41	234,317.13	857,835.54
1912	198,263.08	234,481.50	432,744.58
1913	440,031.70	294,204.52	734,236.22
1914	227,570.36	301,769.43	529,339.79
1915	1,292,171.24	253,120.53	1,545,291.77
1916	152,057.03	430,441.35	582,498.38
1917	664,592.40	235,000.46	899,592.86
Jan. 1 to June 30, 1918	12,781.85		12,781.85
Total	12,575,680.23	2,362,719.51	14,938,399.74

Cost statement by fiscal years, Salt River project.

Year ending June 30—	Construction.	Operation and maintenance during construction.	Total cost.
1906	$2,484,974.27		$2,484,974.27
1907	1,387,755.52		1,387,755.52
1908	1,587,298.68		1,587,298.68
1909	1,981,597.37		1,981,597.37
1910	1,523,242.46		1,523,242.46
1911	913,653.17		913,653.17
1912	668,874.84		668,874.84
	[1] 1,143,593.23	$1,143,593.23	
1913	646,290.55		646,290.55
1914	241,517.49	422,600.01	664,117.50
1915	1,367,272.33	388,279.39	1,755,551.72
1916	106,876.89	514,433.66	621,310.55
1917	311,564.83	549,055.07	860,619.90
		[2] 661,760.66	[2] 661,760.66
1918	498,355.06	6,518.81	504,873.87
Total	12,575,680.23	2,362,719.51	14,938,399.74

[1] Deduct. Transferred to "Operation and maintenance."

[2] Deduct. Transferred to "Net power revenues."

ARIZONA-CALIFORNIA, YUMA PROJECT.

W. W. SCHLECHT, project manager, Yuma, Ariz.

LOCATION.

Counties: Yuma, Ariz.; Imperial, Cal.

Townships: 3 to 13 S., Rs. 21 to 25 W., Gila and Salt River meridians; 9 to 17 S., Rs. 16 to 23 E., San Bernardino meridian.

Railroads: Southern Pacific; Yuma Valley Railroad.

Railroad stations and estimated population June 30, 1918: Yuma, 6,000; Gadsden, Ariz., 100; Potholes, Cal., 25.

WATER SUPPLY.

Source of water supply: Colorado River.

Area of drainage basin: 229,000 square miles above Laguna Dam.

Annual run-off in acre-feet of Colorado River at Yuma (287,000 square miles), 1902 to 1917: Maximum, 26,000,000; minimum, 7,960,200; mean, 17,156,500.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1918: 73,000 acres.

Area under water-right applications and rental contracts, season of 1918: 54,000 acres.

Length of irrigating season: 365 days.

Elevation of irrigable area: 100 to 300 feet above sea level.

Rainfall on irrigable area: Five-year average, 2.53 inches; 1917, 2.22 inches.

Range of temperature on irrigable area: 22° to 118° F.

Character of soil of irrigable area: Bottom lands, rich alluvium; mesa lands, Fresno gravelly sand.

Principal products: Semitropical fruits, alfalfa, grain, and Egyptian long-staple cotton.

Principal markets: Los Angeles and San Francisco, Cal.; Arizona towns; and eastern markets for early produce.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: January 12, 1910; March 8, 1912; March 6, 1913; June 23, 1913; April 7, 1916; April 6, 1917; March 9, 1918; May 7, 1918.

Location of lands opened: T. 15 S., R 23 E.; T. 16 S., Rs. 22 and 23 E.; San Bernardino meridian; T. 8 S., Rs. 23 and 24 W.; T. 9 S., Rs. 23 and 24 W.; T. 10 S., Rs. 24 and 25 W.; T. 11 S., Rs. 24 and 25 W., Gila and Salt River base and meridian.

Limit of area of farm units: Public, 40 acres.

Duty of water: 3½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $55, $66, and $75.

Annual operation and maintenance charge: $1.50 per acre minimum charge, which entitles the water user to 2 acre-feet per acre of irrigable land. Water in excess of this amount will be charged at 75 cents per acre-foot.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.

Construction recommended by board of engineers April 8, 1904.

Construction authorized by Secretary, May 10, 1904.

Canal system of Colorado Valley Pumping & Irrigating Co. purchased March 15, 1907.

First irrigation by Reclamation Service, season of 1907.

Canal system of Yuma Valley Union Land & Water Co. (Farmers' Gravity Canal) purchased February 3, 1908.

Rollins ditch (including Ives heading pumps and ditches) purchased July 23, 1908.

Laguna Dam completed March, 1909.

Colorado River siphon completed June 29, 1912.

Gravity water from Laguna Dam furnished to Yuma Valley through siphon June 29, 1912.

Yuma Valley Railroad constructed June, 1914.

Entire project 86 per cent completed June 30, 1918, exclusive of Yuma Mesa auxiliary project.

IRRIGATION PLAN.

The irrigation plan of the Yuma project provides for the diversion of water from the Colorado River at the Laguna Dam, 10 miles northeast of Yuma, Ariz., into a canal system heading on the California side, conveying water to the irrigable lands on that side of the river, including those in the Yuma Indian Reservation, crossing the river at Yuma through an inverted siphon and serving lands in the Yuma Valley below the town of Yuma. The plan also provides for large pumping plants below Yuma on the east main canal for raising water to irrigate 40,000 acres of mesa land. The lands adjacent to the Colorado River are protected from overflow by means of levees. The United States claims all waste, seepage, unappropriated spring and percolating water arising within the project and proposes to use such water in connection therewith. The Laguna Dam, 348 miles of canals and laterals, including 26 miles of drainage ditches, the Colorado River siphon, 930 feet in length and 14 feet in diameter, and about 80 per cent of the levee system are completed.

SUMMARY OF GENERAL DATA FOR YUMA PROJECT TO END OF FISCAL YEAR 1918.

Areas:			
Irrigable acreage when project is complete			110,000
Public land entered to end of fiscal year		6,500	
Public land withdrawn at end of fiscal year		38,500	
State land		5,800	
Indian land		8,500	
Private land		50,700	
Acreage service could have supplied season of 1917			73,000
Estimated acreage service can supply July 1, 1919			73,000
Acreage actually irrigated, season of 1917			36,956
Acreage cropped under irrigation, season of 1917			35,578
Crops:			
Value of irrigated crops, season of 1917			$3,752,669
Value of irrigated crops, per acre cropped			105.47
Finances:			
Net construction cost to end of fiscal year			$8,972,508.11
Per cent complete at end of fiscal year			[1] 86
Appropriated for fiscal year 1919, total			$590,000.00
Allotment for construction, fiscal year 1919			$79,500.00
Estimated per cent complete, June 30, 1919			[1] 87
Proposed appropriation, fiscal year 1920, for construction			$95,000.00
Estimated gross construction cost to June 30, 1920			$9,542,000.00
Estimate per cent complete, June 30, 1920			[1] 89
Announced construction charges per acre			$55, $66, and $75
Appropriation, fiscal year 1918			$500,000.00
Increase under 10 per cent provision of appropriation			50,000.00
			550,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$443,729.90		
Transfers	37,959.95		
		$481,689.85	
Registered liabilities chargeable to 1918 appropriation		56,772.93	
			538,462.78
Unencumbered balance, July 1, 1918			11,537.22

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[1] Exclusive of Yuma Mesa auxiliary project.

Repayments:		
Value of construction water-rights contracts		$1,768,361.53
Construction charges—		
Accrued to end of fiscal year		458,301.81
Collected to end of fiscal year		291,822.13
Uncollected at end of fiscal year		166,479.68
Operation and maintenance charges (public notice)—		
Accrued to end of fiscal year		125,371.74
Collected to end of fiscal year		104,843.65
Uncollected at end of fiscal year		20,528.09
Water-rental charges—		
Accrued to end of fiscal year		388,389.33
Collected to end of fiscal year		387,422.75
Uncollected at end of fiscal year		966.58
Drainage:		
Estimated acreage damaged by seepage to end of fiscal year		8,500
Miles of drains built to end of fiscal year—		
Open	21.7	
Closed	4	
Total		25.7
Estimated acreage protected by drains built to end of fiscal year		16,000
Estimated acreage to be protected by authorized system		52,000
Cost of drainage works to end of fiscal year		370,871.41

CONSTRUCTION DURING FISCAL YEAR.

Canal system.—In the Yuma Indian Reservation 6 minor structures were built on the lateral system and 1 metal flume and 1 wooden flume were built over the drainage canal.

In the Yuma Valley 1,840 cubic yards of material were moved in building one-fourth mile of lateral; 37 minor structures were built on the distribution system.

Seepage and drainage.—No construction work has been in progress in the Yuma Indian Reservation.

In the Yuma Valley, 254,202 cubic yards of material were moved in excavating the Main Drain Station 146 to 495; 6,100 cubic yards were moved in excavating the drain between the Boundary pumping plant and the Colorado River. Work commenced on excavation for the Boundary pumping plant during November, 1917. At the end of the fiscal year two units of the plant were practically installed and the building walls carried to the roof line. The work involved 5,800 cubic yards of wet excavation, 5,150 cubic yards of dry excavation, 3,180 cubic yards of back fill, 4,951 linear feet of round piling, driving 4,752 linear feet of sheet piling, 1,190 cubic yards of concrete, and placing 27 tons of reinforcing steel, and about 30 tons of hydraulic machinery. A temporary plant has been operated at the Boundary. Elevations taken on test wells throughout the valley show a rise in the ground-water surface.

River front protection.—Yuma Indian Reservation: 83,174 cubic yards of rock revetment were placed on the Reservation levee at points 5, 7, and 9 miles from Potholes.

Yuma Valley: 74,748 cubic yards of rock revetment were placed on the Yuma Valley levee, mainly at the 17 and 21 mile points; 41,180 cubic yards of rock were furnished the Imperial irrigation district for work at the Andrade weir.

BOARD REPORTS.

Date.	Subject.	Personnel.
1917. Sept. 25	Report to chief of construction, by board of engineers, on Yuma Mesa auxiliary project.	D. C. Henny, consulting engineer; Jas. M. Gaylord, electrical engineer; W. W. Schlecht, engineer.
1918. Jan. 24	Report to chief of construction, by board of engineers, on Yuma Mesa auxiliary project.	D. C. Henny, consulting engineer; W. W. Schlecht, engineer.
Jan. 23	Report to director and chief engineer, by board of engineers, on drainage, Yuma Valley, Yuma project.	D. C. Henny, consulting engineer; F. E. Weymouth, chief of construction, and W. W. Schlecht, engineer.
May 9	Report to United States Reclamation Service and Imperial irrigation district, on All-American Canal into Imperial Valley.	Elwood Mead, chairman, representing University of California; C. E. Grunsky, representing Imperial Valley; and W. W. Schlecht, representing United States Reclamation Service.

OPERATION AND MAINTENANCE.

Water was delivered on a weekly rotation schedule during the heavy irrigation season and every two weeks during the winter months. The maintenance of the lateral system is large on account of the rapid and heavy growth of weeds. The laterals are cleaned by the V machine. The main canals are cleaned of silt deposit by the use of drag-line excavators. Very few canal breaks occurred during the year. Water is being delivered to the white and Indian lands in the Yuma Indian Reservation under water-right applications. Water was delivered to Yuma Valley up to December 31, 1917, on a rental basis at the rate of 50 cents per acre-foot. Water-right applications were supposed to have been made for the irrigation season of 1918, but on account of the suit of the water users' association, a court stipulation was made, providing for the furnishing of water at the minimum rate of 2 acre-feet for $1.50, and additional water at the rate of 75 cents per acre-foot. Some 10,000 acres, however, took out the regular water-right applications, and about 30,000 acres took out temporary contracts.

The North Gila Valley has been eliminated from the project, but was operated by the Government until December 31, 1917, after which time the Government allowed the farmers the use of the canal system, and the unit is now being operated by them as an irrigation district.

Historical review, Yuma project.

Item.	1913	1914	1915	1916	1917	1918
Area for which service was prepared to supply water..	50,000	60,000	71,200	72,440	73,000	73,000
Acreage irrigated	19,607	25,207	27,857	29,483	36,956	50,000
Number of farms irrigated	616	698	737	790	900	1,000
Miles of canals operated	228	272	307	316	335	335
Water diverted (acre-feet)	127,307	154,670	246,786	249,700	337,597	400,000
Water delivered to land (acre-feet)	85,411	93,167	92,897	94,393	136,541	185,000
Acre-feet to acre for area under cultivation	4.36	3.69	3.34	3.20	3.7	3.7

SETTLEMENT.

Great progress has been made in the development of the project during the past year. The raw land held for speculation and lands owned by nonresidents have for the most part been sold to settlers who are doing their utmost to put these lands into crops, so as to reap the benefit of the high price of farm products. The lands allotted to the Indians in the Yuma Indian Reservation have practically all been leased to whites, who have the land in cultivation. The supply of farms for sale and for rent was not sufficient to meet the demand. Land values have practically doubled during the past three years.

Settlement data, Yuma project.

Item.	1913	1914	1915	1916	1917	To June 30, 1918.
Total number of farms on project (when completed).	4,000	4,000	4,000	4,000	4,000	4,000
Number of farms reported	616	698	737	790	900	1,000
Population	1,663	1,815	2,036	2,002	2,700	2,800
Number of towns	3	3	4	5	5	5
Population	4,075	4,200	4,385	5,345	6,735	7,000
Total population of towns and farms	5,738	6,015	6,421	7,347	9,435	9,800
Number of public schools	13	14	15	17	20	20
Number of churches	6	7	7	9	9	10
Number of banks	3	3	4	4	4	4
Total capital stock of banks						$175,000
Amount of deposits						$1,321,468
Number of depositors						4,572

PRINCIPAL CROPS.

The principal crops raised on the project during 1917 were cotton, alfalfa hay, alfalfa seed, milo maize, Kaffir corn, feterita, wheat, and barley. Practically all of the new lands being brought under cultivation were planted to cotton. The prices received for all crops have been high.

Crop report, Yuma project, Arizona-California, year of 1917.

Crops.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	12,901	Ton	43,177	3.3	$15.00	$642,870	$49.83
Alfalfa seed	4,643	Bushel	26,475	5.7	9.93	262,928	56,62
Barley	716	...do	21,578	30.0	1.13	24,366	34.03
Beans	367	...do	4,454	12.0	4.55	20,329	55.39
Indian corn	346	...do	10,230	29.0	1.05	10,757	31.08
Corn, sorghum	6,883	...do	280,539	40.0	1.00	281,120	40.84
Cane and cane fodder	309	Ton	1,770	5.7	9.00	15,930	51.55
Cotton, Egyptian	4,270	Pound	1,064,804	249.0	.70	743,787	174.19
Cotton, Durango	369	...do	173,150	469.0	.31	53,676	145.46
Cotton, short staple	8,067	...do	4,015,500	498.0	.28	1,124,340	139.37
Cotton seed		Ton	6,190		58.00	359,020	28.25
Wheat	184	Bushel	3,479	19.0	1.81	6,314	34,31
Fruit	155					7,544	48.67
Truck	746					80,617	108.06
Hay—except alfalfa	306	Ton	882	2.5	10.00	8,811	28.79
Pasture	1,857					24,278	13.07
Broom corn	303	Ton	98	.33	264.79	25,950	85.64
	42,422						
Estimated additional revenue derived from feeding alfalfa straw and pasturing feterita and milo maize stalk land						60,032	
Less duplicated areas	6,844						
Total cropped acreage	35,578	Total and average				3,752,669	105.4

		Areas.	Acres	No. farms.
Net area irrigated without crop	1,378	Total irrigable area farms reported	55,743	900
		Total irrigated area farms reported	36,956	900
		Under water right applications		279
		Under rental contracts		621
Total irrigated acreage	36,956	Total cropped area farms reported	35,578	

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, MARCH 9, 1918.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof and supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), public notice for the Bard subdivision lands of the first unit of the Yuma project, Arizona-California, is hereby issued, as follows:

2. **Lands for which water will be furnished.**—Upon proper water-right application being made therefor, water will be furnished under said project in the irrigation season of 1918 and thereafter, for the irrigable lands of the Bard subdivision of the first unit, shown on a farm-unit plat of T. 16 S., R. 23 E., San Bernardino Meridian, California, approved by the Secretary of the Interior on December 13, 1909, and amended by the Acting Director of the Reclamation Service on the date of this notice, the plat as amended being on file in the office of the project manager, United States Reclamation Service, Yuma, Ariz., and in the local land office at El Centro, Cal.

3. **When and how to make entry for public land.**—Homestead entries for the farm units shown on said plat embracing public lands of the United States may be made beginning March 28, 1918, at 9 o'clock a. m., at the said local land office. Every person desiring to acquire any of said public lands must execute a homestead application subject to the provisions of the reclamation law in manner required by law, which, with the required fees and commissions, accompanied by certificate of the project manager as to the filing of water-right application and payment of charges as hereinafter provided, may be presented to said local land office, in person, by mail, or otherwise, within a period of 5 days prior to the opening, to wit: On and from March 23, 1918, to and including 9 o'clock a. m., March 28, 1918. Applications presented after said period of five days will be filed and noted in the order of their receipt. Any applications not based on a prior settlement right will be subject to valid settlement claims asserted in the manner required by law.

4. **Simultaneous filings for public lands.**—Applications reaching said local land office during said period of five days will be held and treated as simultaneously filed, and the register and receiver will dispose of them as follows:

(*a*) Where there is no conflict the application will be allowed, irrespective of whether settlement is alleged.

(*b*) In case of conflicting applications and only one of the applicants alleges prior settlement his application will be allowed and the others rejected.

(*c*) If two or more conflicting applications, each containing allegations of prior settlement, are received, a hearing, restricted to those alleging such right, will be ordered to determine the priority of right.

(*d*) Where there are conflicting applications in which no one of the several applicants claims prior settlement the register and receiver will write on cards the names of the several applicants, and each of these cards will be placed in an envelope upon which there is no distinctive or identifying mark, and at 2 o'clock p. m., on the date of opening to entry, if practicable (if not, at the same hour one day later), after all the envelopes containing the names of the several applicants shall have been thoroughly mixed in the presence of such persons as may desire to be present, they will be drawn and numbered in order. The cards as drawn and numbered will be securely fastened to the applications of the respective persons, and the applications will be allowed in such order. Applications conflicting in whole with those previously allowed will be rejected in the usual manner.

5. **Failure of applicant to obtain public land applied for.**—Where any applicant fails to obtain land applied for by him he will be permitted to elect whether he will amend his application to embrace other lands not affected by pending applications and otherwise subject thereto when such amended application is presented, or withdraw his original application without prejudice. In the event of such withdrawal the fees and commissions will be returned by the receiver, and the charges deposited will be returned by the project manager, upon surrender of the certificate of filing issued by the project manager.

6. **Warning against unlawful settlement upon public land.**—No person will be permitted to gain or exercise any right whatever under any settlement or occupation of any of said public lands, begun at or prior to 9 a. m., March 28, 1918: *Provided, however,* That this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

7. **Limit of area for which water right may be secured.**—The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such lands, is fixed as shown upon the plats for the several farm units.

8. **Application for water right.**—All water-right applications must be made to the project manager, United States Reclamation Service, Yuma, Ariz., upon forms provided for that purpose, and may be made on and after the date hereof. Each application must be for a specified farm unit, and more than one person may make such application for the same farm unit. A certificate of filing will be issued each applicant by the project manager. Filing of application and issuance of certificate give no preference right to entry on public lands. Only when the project manager is notified by the local land office that an entry has been allowed will acceptance of the application be indorsed thereon. Whereupon all other applications affecting the farm unit in question with payments made will be returned to the respective applicants, upon surrender by them of the certificates of filing issued by the project manager.

9. **Classes of charges.**—The charges to be paid are of three kinds, to wit: (1) A charge for each acre of land entered, to be paid for the benefit of the Indian Owners, termed the Indian charge; (2) a charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge; and (3) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

10. **Indian charge.**—The charge to be paid for the benefit of the Indian owners, shall be $10 for each acre of land entered, in accordance with the provisions of the act of April 21, 1904 (33 Stat., 224). This charge shall be payable in the same manner and instalments as the construction charge, as announced in the next section of this notice.

11. **Construction charge.**—The construction charge shall be $90 per acre of irrigable land. An initial payment of 5 per cent of the construction charge shall be made at the time of filing water-right application, and the remainder of the construction charge shall be due and payable in 15 annual instalments, the last 5 of which shall each be 5 per cent and the remainder each 7 per cent of the total construction charge. The first of said 15 annual instalments shall become due and payable December 1 of the fifth calendar year after the initial instalment, and subsequent instalments shall become due and payable on December 1 of each calendar year thereafter.

12. **Advance payment of construction and Indian charges permissible.**—Any water-right applicant or entryman may, if he so elects, pay the whole or any part of the construction or Indian charge owing by him within any shorter period than that provided by this public notice.

13. **Operation and maintenance charge.**—The minimum operation and maintenance charge for the year 1918 and thereafter until further notice, shall be $1.50 per irrigable acre, whether water is used thereon or not, which will entitle the applicant to 2 acre-feet of water per irrigable acre. Additional quantities will be furnished for 75 cents per acre-foot. All such charges will be due and payable annually on March 1 following the irrigation season.

14. **Place and manner of payment of charges.**—All charges must be paid at the office of the United States Reclamation Service, Yuma, Ariz., in currency or by New York draft or money order payable to special fiscal agent, United States Reclamation Service.

15. **Exclusion of lands by action of Colorado River.**—Every water-right application shall contain the following provision: The applicant hereby releases the United States from any and all claims for loss or damages on account of (1) the exclusion of said lands or any part thereof, from the irrigable lands of said project, or (2) the failure to supply water for the irrigation of any part of the land hereinbefore described when such exclusion or failure is due to (a) the destruction, by flood, erosion, encroachment, or other action of the Colorado River, of the levees erected by the Reclamation Service along the banks of said river, or (b) a change in the location of said levees when such change is considered necessary by the proper officials of the United States to prevent the destruction of said levees from the said causes. Land so excluded shall be relieved from payment of all instalments of construction and of operation and maintenance charge which otherwise would thereafter come due from the lands so excluded.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, MAY 7, 1918.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof, or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), and the Yuma settlers' relief act of August 17, 1916 (39 Stat., 516), public notice for the Yuma project, Arizona-California, is hereby issued as follows:

2. **Lands for which water will be furnished.**—Upon proper water-right application being made therefor, water will be furnished under said project in the irrigation season of 1918 and thereafter, for the irrigable lands of said project, shown on a diagram, approved by the Reclamation Commission January 5, 1918, amendatory of the farm unit plat of T. 10 S., R. 25 W., Gila and Salt River base meridian, approved by the department, January 15, 1917, said diagram and plat being on file in the office of the project manager, Yuma, Ariz., and at the local land office, Phœnix, Ariz.

3. **Entry for public land.**—Homestead entry on the farm unit shown on said diagram embracing public land of the United States may be made at said land office if found regular and accompanied by the certificate of said project manager that water-right application has been filed and proper water-right charges deposited.

4. **Public notice of April 6, 1917, applicable.**—All of the terms and conditions of the public notice for the Yuma project, dated April 6, 1917, so far as the same may be applicable, shall apply to the lands covered by this public notice and shown on the diagram above described.

E. C. Bradley,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Yuma project, June 30, 1918.

Cash		$2,571.92
Inventory of stock on hand		104,423.83
Accounts receivable		1,502,857.64
Construction cost	$9,368,248.42	
Less construction revenue earnings	395,740.31	
		8,972,508.11
Operation and maintenance cost	316,434.03	
Less operation and maintenance revenue earnings	48,295.08	
		268,138.95
Total		10,850,500.45
Accounts payable		65,409.09
Contingent obligations		2,571.92
Reserves for repayment to reclamation fund of cost of project		1,903,168.94
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	10,027,259.54	
Collection, transfer, refund, and joint construction vouchers issued	1,147,909.04	
Net investment		8,879,350.50
Total		10,850,500.45

Feature costs of Yuma project, June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys:		
General	$3,443.09	$175,987.89
Yuma Mesa auxiliary	8,373.07	18,528.56
All-American Canal	[1] 4,570.58	[1] 4,570.58
	7,245.58	189,945.87
Canal system:		
Preliminary work		167,514.46
Laguna Dam in Colorado River	769.72	1,749,811.04
Headworks at Laguna Dam		352,334.25
Main Canal	907.91	542,779.06
Siphon under Colorado River at Yuma		694,703.22
Other structures on Main Canal		65,422.53
	1,677.63	3,572,564.56

[1] Deduct.

Feature costs of Yuma project, June 30, 1918—Continued.

Principal feature.	Costs.	
	Fiscal year 1918.	Total to June 30, 1918.
Lateral system:		
Yuma Valley	[1] $2,154.51	$988,350.28
Indian reservation and Gila Valley	302.93	518,787.24
	[1] 1,851.58	1,507,137.52
Drainage system:		
Yuma Valley	59,802.18	118,540.76
Yuma Valley pumping plant	106,181.20	106,181.20
Indian reservation		146,149.45
	165,983.38	370,871.41
Flood protection:		
Yuma Valley	79,731.39	1,370,432.43
Indian reservation	42,173.19	847,431.65
Gila Valley	426.71	405,363.97
	122,331.29	2,623,228.05
Farm units		32,514.60
Permanent improvements	945.58	174,098.67
Telephone system	293.03	12,468.11
Operation and maintenance during construction	57,960.75	722,313.37
Balance in plant accounts	[1] 38,507.64	162,402.54
Unadjusted clearing accounts	176.54	703.72
Gross construction cost to June 30, 1918	316,254.56	9,368,248.42
Less revenue earned during construction period:		
Rental of buildings	861.40	6,775.46
Rental of grazing and farming lands	777.50	1,370.50
Rental of irrigation water	25,360.26	346,511.15
Contractors' freight refunds		18,505.86
Other revenues, unclassified	17,332.32	23,366.27
Loss on hospital operations	989.70	[1] 155.29
Loss on railroad operations	1,229.07	[1] 633.64
	46,550.25	395,740.31
Net cost of construction of project to June 30, 1918		8,972,508.11

[1] Deduct.

Cost statement, by calendar years, Yuma project.

Year ending Dec 31—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total	
1907	$1,559,917.35	$8,531.91		$8,531.91	$1,568,449.26
1908	1,151,270.00	31,976.49		31,976.49	1,183,246.49
1909	772,675.05	52,776.24		52,776.24	825,451.29
1910	408,696.34	77,866.11	$17,607.12	95,473.23	504,169.57
1911	913,555.20	81,346.35	42,439.91	123,786.26	1,037,341.46
1912	1,295,435.08	80,584.55	20,225.72	100,810.27	1,396,245.35
1913	307,134.30	54,408.32	16,305.40	70,713.72	377,848.02
1914	460,027.80	59,641.00	29,974.20	89,615.20	549,643.00
1915	695,992.32	78,596.70	32,233.85	110,830.55	806,822.87
1916	387,435.92	88,056.69	59,519.66	147,576.35	535,012.27
1917	333,052.15	108,529.01	28,024.86	136,553.87	469,606.02
Jan. 1 to June 30, 1918	197,637.28		70,103.31	70,103.31	267,740.59
Plant and clearing accounts on June 30, 1918	163,106.26				163,106.26
Total	8,645,935.05	722,313.37	316,434.03	1,038,747.40	9,684,682.45

Cost statement by fiscal years, Yuma project.

Year ending Dec. 31—	Construction	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1908	$2,072,001.51				$2,072,001.51
1909	1,154,114.78				1,154,114.78
1910	491,356.42				491,356.42
1911	596,830.96				596,830.96
1912	1,575,164.44				1,575,164.44
1913	465,201.95				465,201.95
1914	287,424.01	$419,182.61		$419,182.61	706,606.62
1915	804,776.88	70,036.90	$141,480.56	211,517.46	1,016,294.34
1916	433,692.14	83,015.25	54,859.59	137,874.84	571,566.98
1917	305,640.79	92,117.86	34,935.65	127,053.51	432,694.30
1918	296,624.91	57,960.75	85,158.23	143,118.98	439,743.89
Plant and clearing accounts on June 30, 1918	163,106.26				163,106.26
Total	8,645,935.05	722,313.37	316,434.03	1,038,747.40	9,684,682.45

Estimated cost of contemplated work, Yuma project, during fiscal year 1919.

Features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and survey:		
For hydrographic data, Colorado River	$1,000	
Investigations, All-American Canal to Imperial Valley	12,000	
Investigations, Yuma Mesa auxiliary project	4,000	
		$17,000
Canal system—Enlargement of canals for marginal lands		2,000
Lateral system—Extension of lateral system to marginal lands		6,000
Drainage system:		
For reading test wells	3,000	
For excavation, main drain	49,000	
		52,000
Farm units—Surveys of marginal lands		1,000
Permanent improvements—Completion of three houses at Yuma		3,000
Telephone system—Extension of telephone system to marginal lands		500
Operation and maintenance, water rental basis—Operation and maintenance of 4,000 acres		10,000
Operation and maintenance, public notice:		
Bard and Indian units (15,000 acres)	40,000	
Yuma Valley unit (48,000 acres)	113,000	
For maintenance of levees, 38 miles	155,000	
		308,000
Reimbursable accounts—Working fund for mess houses, hospitals, and railroad operations		2,000
Total		401,500

Operating expenses and revenues Yuma project to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Canal system:						
Laguna Dam and headworks	$1,275.57	$2,551.14	$3,826.71	$10,120.36	$45,983.65	$56,104.01
Main canal	1,249.32	2,498.64	3,747.96			
	2,524.89	5,049.78	7,574.67	10,120.36	45,983.65	56,104.01
Lateral system:						
Bard unit	3,796.91	7,593.83	11,390.74	50,066.39	87,966.49	138,032.88
Indian unit	4,560.86	9,121.72	13,682.58	15,136.66	33,683.42	48,820.08
Yuma Valley unit	16,949.03	33,898.08	50,847.11	16,949.03	33,898.08	50,847.11
	25,306.80	50,613.63	75,920.43	82,152.08	155,547.99	237,700.07
Drainage system	554.37	1,108.76	1,663.13	7,993.95	14,636.00	22,629.95
Total	28,386.06	56,772.17	85,158.23	100,266.39	216,167.64	316,434.03

Operating expenses and revenues Yuma project to June 30, 1918—Continued.

REVENUES.

Item.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$25,868.41	$125,371.74
Operation and maintenance charges paid and forfeited by water-right applicants	2,544.81	3,332.11
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	1,012.60	1,376.72
Rental of land and buildings during operating period	104.00	5,226.74
Rentals of irrigation water	41,878.18	41,878.18
Other revenues unclassified, earned during operating period	1,156.66	1,190.16
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants (contra)	[1] 306.32	[1] 516.32
Total	72,258.34	177,859.33
Difference (deficit)	12,899.89	138,574.70

Deduct.

CALIFORNIA, ORLAND PROJECT.

A. N. Burch, project manager, Orland, Cal.

LOCATION.

Counties: Glenn and Tehama; reservoir and storage feed canal in Colusa County.

Townships: 21 to 23 N., Rs. 2 to 4 W., Mount Diablo meridian.

Railroads and other transportation lines: Southern Pacific Railroad and steamers on Sacramento River.

Railroad station and estimated population June 30, 1918: Orland, 1,550; railroad flag stations with freight sidetracks, Greenwood, Wyo., and Malton.

WATER SUPPLY.

Source of water supply, Stony Creek.

Area of drainage basin: Above project diversion dams, 735 square miles; above feed canal diversion dam, 97 square miles; above East Park Dam (Little Stony), 102 square miles.

Annual run-off in acre-feet: Stony Creek, near Fruto (601 square miles), 1907 to 1913—maximum, 940,000; minimum, 135,200; mean, 500,000. Little Stony Creek, at East Park Dam (102 square miles), 1907 to 1917—maximum, 170,800; minimum, 12,600; mean, 65,700.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1918: 20,487 acres

Area under water-right applications, season of 1918: 18,477 acres.

Length of irrigation season, 1918: From February 6 to December 1—296 days.

Average elevation of irrigable area: 250 feet above sea level.

Rainfall on irrigable area: 1883 to 1917—average, 17 inches; 1917, 9.92 inches.

Range of temperature on irrigable area: 26° to 114° F.

Character of soil of irrigable area: Sandy and gravelly loam, silt loam, clay loam.

Principal products: Alfalfa, milo, citrus and other fruits, nuts, and vegetables.

Principal markets: San Francisco, Cal.; Portland, Oreg.; eastern markets.

LANDS OPENED FOR IRRIGATION.

Dates of orders and public notices: April 26 and May 24, 1916; February 8 and 21, 1917; March 22 and April 2, 1918.

Location of lands opened: Tps. 21 and 22 N., R. 2 W.; Tps. 21, 22, and 23 N., R. 3 W.; Tps. 22 and 23 N., R. 4 W., Mount Diablo base and meridian.

Limit of area of farm units: 40 acres, except that original subscribers are qualified to make water-right applications for an area not to exceed 160 acres.

Building charge per acre of irrigable land: $44.

Charge per irrigable acre, under supplemental contract for lining canals and laterals with concrete: $11.

Annual operation and maintenance charge: $1.50 per irrigable acre, permitting delivery of 2½ acre-feet of water; 50 cents for the first, 25 cents for the second, 15 cents for the third, and 50 cents per acre-foot for all further quantities.

CHRONOLOGICAL SUMMARY.

Reconnoisance and preliminary surveys made in 1906.

Construction recommended by board of engineers November 12, 1906.

Construction authorized by Secretary, October 5, 1907.

First irrigation by Reclamation Service, season of 1910.

East Park Dam completed July, 1910.

Construction of East Park Feed Canal and second unit of the project authorized by Secretary July 25, 1913.

East Park Feed Canal completed June 30, 1915.

Entire project 80 per cent completed June 30, 1918, including supplemental construction.

IRRIGATION PLAN.

The irrigation plan of the Orland project provides for the storage of water in a reservoir controlled by East Park Dam on Little Stony Creek, about 40 miles southwest of Orland, Cal., and a feed canal 7 miles long connecting the storage basin with Stony Creek. The diversion works for the feed canal are located about 3½ miles west of Stonyford. For the irrigation of lands in the vivinity of Orland water is diverted from Stony Creek into the canal systems at two points—namely, Miller Buttes, 9½ miles northwest of Orland, for the South Canal system, and at the north side weir, 5 miles northwest of Orland, for the North Side Canal system. The South Canal system is to irrigate 13,000 acres on the south side and the North Canal system 7,000 acres on the north side of Stony Creek. The stored water is conveyed from East Park in the natural creek channel 41 miles to the Miller Buttes diversion and 45 miles to the north side weir, where it is taken out in distribution systems comprising 128 miles of canals and laterals. The plan also includes a high-line canal from which power may be developed for pumping. The United States intends, for and in connection with the project, to use the waste, seepage, spring, and percolating water arising within the same, and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law heretofore made for the purposes of the project.

The principal work now under way consists of placing concrete lining in the canal and lateral systems under a supplemental agreement with the water users.

The present limits of the Orland project may be considered as a unit of the Sacramento Valley project. It may be extended by constructing additional reserviors on Stony Creek and its tributaries. The chief additional reservoir sites available are Millsite, on Stony Creek, near Fruto; Briscoe, on Briscoe Creek, near Elk Creek; Stonyford, on Stony Creek, at Stonyford, and Stony Gorge, on Stony Creek, near Elk Creek.

SUMMARY OF GENERAL DATA FOR ORLAND PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:		
Irrigable acreage when project is complete		[1] 20,533
Private land		[1] 20,533
Acreage service could have supplied season of 1917		20,533
Estimated acreage service can supply July 1, 1919		20,533
Acreage actually irrigated, season of 1917		12,729
Acreage cropped under irrigation, season of 1917		9,608
Crops:		
Value of irrigated crops, season of 1917		$543,570.00
Value of irrigated crops, per acre cropped		$56.57
Finances:		
Net construction cost to end of fiscal year [2]		$893,289.45
Per cent complete at end of fiscal year [3]		80
Appropriated for fiscal year 1919, total		$95,000.00
Allotment for construction, fiscal year 1919		$39,650.00
Estimated per cent complete, June 30, 1919		85
Proposed appropriation, fiscal year 1920, for construction		$64,000.00
Estimated gross construction cost to June 30, 1920		$1,124,650.00
Estimated per cent complete, June 30, 1920 [3]		90
Announced construction charges per acre		$44.00
Supplemental construction charges per acre		$11.00
Appropriation, fiscal year 1918	$43,000.00	
Increase under 10 per cent provision of act	4,000.00	
Total appropriation		$47,000.00

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[1] Includes 320 acres vested rights and 46 acres of town and school sites.
[2] Including Stony Gorge unit surveys, $1,328.35.
[3] Including supplemental construction.

Finances—Continued.			
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$40,069.82		
Transfers	2,529.85		
		$42,599.67	
Registered liabilities chargeable to 1918 appropriation		2,903.51	
			$45,503.18
Unencumbered balance, July 1, 1918			1,496.82

Repayments:	
Value of construction water-right contracts	1,019,778.87
Construction charges—	
Accrued to end of fiscal year	36,082.04
Collected to end of fiscal year	36,082.04
Operation and maintenance charges (public notice)—	
Accrued to end of fiscal year	26,477.48
Collected to end of fiscal year	26,382.17
Uncollected at end of fiscal year	95.31
Water-rental charges—	
Accrued to end of fiscal year	119,600.22
Collected to end of fiscal year	119,600.22

CONSTRUCTION DURING FISCAL YEAR.

Lateral system.—Construction work consisted of placing concrete lining, building minor structures, largely storm culverts, and farm lateral crossings for roads along ditch rights of way, and grading such roads for the use of the operating force.

The following work was accomplished:

Excavation	cubic yards	1,458
Concrete	do	715
Concrete lining (1½ inches thick)	square yards	16,994
Minor structures	number	33

SEEPAGE AND DRAINAGE.

Drainage conditions on the project are favorable. In general the soil is porous, is entirely free from deleterious salts, and has good surface and subsurface drainage. There are no seeped areas and no serious rising of ground water has occurred. The project is well supplied with natural drainage channels, and with proper care of these by the landowners when they prepare their land for irrigation practically all danger from waterlogging will be eliminated.

The drainage plans for the project provide for coordinating the work with the farmers as agricultural development advances, the problem consisting primarily of taking care of storm water during the winter season by building open drains where needed to connect with natural channels. Incidentally this will provide for any needed drainage during the irrigation season. As most of the project requires little of this work, other than that which should be done by the farmers as a regular part of their plans in preparing their lands for irrigation, the situation can be best and most economically handled in cooperation with the landowners as development proceeds. This work was commenced in 1916 and will be continued as occasion arises, utilizing a small amount of funds provided for this purpose in fixing the building cost of the project.

OPERATION AND MAINTENANCE.

Practically the whole system, consisting of the storage works, feed canal, and 138 miles of canals and laterals, was operated.

Water was turned in for irrigation on February 6, and with the exception of a few days during the latter part of the mouth was run continuously to October 1. It was again turned in during the latter part of October and run until December 1, making a 10 months' irrigation season, the longest since the project was established.

A very considerable expense for maintenance not anticipated at the beginning of the year was incurred in providing guards for the storage works at East Park. Beginning April 1, with the exception of a period of 40 days, during which the War Department detailed a detachment of soldiers for duty at East Park, civilian guards were maintained by the service. A further expense which had no bearing on the normal expense of operating and maintaining the system was incurred in obtaining and preparing data for use in initiating proceedings for an adjudication of water rights on Stony Creek. The cost of these two items of extraordinary expense amounted to $4,528.01.

Historical review, Orland project.

Item	1914	1915	1916	1917	1918[1]
Acreage for which Service was prepared to supply water	14,300	20,193	[2] 20,533	[2] 20,533	[2] 20,533
Acreage irrigated	7,354	8,928	9,357	12,729	16,500
Miles of canal operated	93	115	128	138	138
Water stored (acre-feet)	45,600	48,000	48,000	51,000	42,000
Water diverted (acre-feet)	50,000	52,000	60,000	74,000	55,000
Water delivered to land (acre-feet)	30,000	30,300	38,100	44,400	41,000
Per acre of land irrigated (acre-feet)	4.08	3.40	4.07	3.50	2.50

[1] Estimated. [2] Includes 320 acres of vested water rights and 46 acres of town and school sites.

SETTLEMENT AND DEVELOPMENT.

There were 147 new farms brought under whole or partial cultivation during the year, and at the close of the year settlement had been made on 46 farms not taken account of in the 1917 census. The increase in population on irrigated land was 258, and for the whole project, including the town of Orland, it is estimated at 750. About $150,000 were invested by the farmers in farm buildings and equipment. Nineteen hundred and seventeen was the most prosperous year of the project.

On December 31, 1917, bank deposits in Orland, the only town in the project, amounted to $933,779, an increase during the calendar year of $396,363, which is remarkable considering the size of the community, the financing of a great deal of new development, and the large drain due to subscriptions and contributions to the various war funds.

Settlement data, Orland project.

Item.	1915	1916	1917	1918
Total number of farms on project	509	509	699	725
Population	1,600	1,700	1,900	2,000
Number of irrigated farms	351	384	531	575
Operated by owners	320	342	448	485
Operated by tenants	31	42	83	90
Population	1,258	1,260	1,518	1,700
Number of towns	1	1	1	1
Population	1,500	1,550	1,550	1,600
Total population	3,100	3,250	3,450	3,600
Number of public schools	8	8	8	9
Number of churches	6	7	7	7
Number of banks	2	2	2	2
Total capital stock	$141,000	$141,000	$141,000	$141,000
Amount of deposits	$396,000	$445,000	$755,000	$950,000
Number of depositors	1,708	1,800	2,420	2,800

PRINCIPAL CROPS.

On account of the necessity of increased food production, unusual effort was made to increase the amount of land under cultivation, but because of the unusually dry spring, rendering it impossible to properly prepare land for irrigated crops in time for planting, results were not so great as was hoped. However, much credit is due the farmers for the additional land that was at least partially cropped under adverse conditions.

The number of irrigated farms increased from 384 to 531, with an increase from 9,357 acres to 12,792 in irrigated land.

The acreage of alfalfa cut for hay remained the same as for the previous year with a decrease in yield of 3,300 tons, due to the serious inroads of grasshoppers on the third crop. The value of the crop, based on the average market price for loose hay was $142,400 more than that of 1916.

The acreage of sorghum corn was 2,500, an increase of 1,660 acres for the year, with a total yield of 70,970 bushels, an increase of 45,600 bushels for the year.

Oranges and almonds yielded only about 20 per cent of the average crops.

Dairying continued to lead all other industries of the project, and prices for butter fat were higher than for 1916.

The inventory for stock equipment shows a present value of $548,720, an increase of $75,156 for the year.

The total carload shipments from Orland in 1917 were 664, as follows: Live stock, 194; wool, 7; wheat, 27; barley, 155; alfalfa hay, 189; alfalfa meal, 75; sorghum corn, 6; fruits and vegetables, 10. The principal less-than-car-lot shipments were: Butter, 580 tons; and poultry, 60 tons.

Crop report, Orland project, California, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	5,331	Ton	25,700	4.8	$14.10	$362,370	$67.97
Other hay	316	...do	431	1.4	16.50	7,110	22.50
Pasture	2,994					18,992	6.34
Corn, sorghum	2,495	Bushel	70,970	28.4	1.50	106,455	42.66
Onions	40	...do	10,000	250	.20	2,015	50.37
Potatoes	65	...do	3,900	60	.75	2,925	45.00
Beans	79	...do	602	7.6	5.40	3,250	41.15
Garden	279					18,837	67.52
Nursery	8					3,200	400.00
Small fruits	6					700	116.67
Citrus fruits	121	Pound	81,600	67.5	.03	2,448	20.23
Deciduous fruits [1]	62	...do	109,250	1,762	.02	2,185	35.24
Almonds	161	...do	30,960	192	.17	5,263	32.69
Prunes, dried	40	...do	76,000	1,900	.07	5,320	133.00
Miscellaneous	80					2,500	31.25
Less duplicated areas	2,469						
Total cropped	9,608	Total and average				543,570	56.57

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Irrigable area farms reported	14,450	531	70.4
Nonbearing orchard	1,618	Irrigated area farms reported	12,729	531	61.9
Young alfalfa	660	Under water right applications	12,449	529	60.6
Not cropped	843	Under rental contracts	120		.6
Grand total irrigated	12,729	Vested rights	160	2	.8
		Cropped area farms reported	9,608	531	46.7

[1] Small mixed orchards.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, MARCH 22, 1918.

1. **Annual operation and maintenance charges.**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is made that the annual operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice, against all lands of the Orland project, California, under public notice, shall be a minimum charge of $1.50 per irrigable acre whether water is used thereon or not, which charge will permit the delivery of not to exceed 2½ acre-feet of water per acre; and that additional water will be furnished at the rate per irrigable acre, of 50 cents for the first additional acre-foot, 25 cents for the second additional acre-foot, 15 cents for the third additional acre-foot, and 50 cents per acre-foot for all further quantities. All operation and maintenance charges will be due and payable on March 1 of each year for the preceding irrigation season;

2. **Method of billing and payment.**—The minimum charge aforesaid will be billed to, and payment thereof to the United States, made through the Orland Unit Water Users' Association. The charges in excess of the minimum rate will be billed direct to the water users and payment thereof made by them to the special fiscal agent, United States Reclamation Service, at the project office.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, APRIL 2, 1918.

1. **Supplemental construction.**—Under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly section 4 of the reclamation extension act of August 13, 1914 (38 Stat., 686), a majority of the water-right applicants and owners of the lands included in the Orland project, California, have made agreements providing for an increase in the cost of construction in the sum of $11 per irrigable acre. This increased cost is for the lining of project canals and laterals with concrete, as provided by said agreements, such work to be limited to a cost not to exceed $11 per irrigable acre of land.

2. **Ratification.**—The said agreements are hereby ratified and confirmed, and the said increase in the construction charge of $11 per acre against each irrigable acre under public notice, within the Orland project is hereby approved and made effective in accordance with the conditions of said agreements and as herein specified.

3. **Payment of increased charge.**—Such increased charge of $11 per irrigable acre shall be added as a construction charge against the land in question and be paid in additional annual instalments as follows; Two per cent of such increased charge shall be added to each of the instalments of construction charge now due December 1, 1918, and December 1, 1919; 4 per cent to each of the instalments due December 1, 1920, and December 1, 1921; 6 per cent to the instalments due December 1, 1922, and to each of the instalments due December 1 of each year thereafter to and including the year 1934; and 10 per cent to the instalments due December 1, 1935.

E. C. BRADLEY,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Orland project, June 30, 1918.

Cash		$22.00
Inventory of stock on hand		2,546.39
Accounts receivable		983,792.14
Construction cost	$1,020,988.89	
Less construction revenue earnings	127,699.44	
		893,289.45
Operation and maintenance cost	46,367.46	
Less operation and maintenance revenue earnings	1,666.33	
		44,701.13
Total		1,924,351.11
Accounts payable		2,921.19
Contingent obligations		22.00
Reserves for repayment to reclamation fund of cost of project		1,047,969.69
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	$1,079,863.12	
Collection, transfer, refund, and joint construction vouchers issued	206,424.89	
Net investment		873,438.23
Total		1,924,351.11

Feature costs of Orland project to June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys:		
Experimental investigations		$3,213.47
Investigation, unused sites		456.49
General expense		465.94
		4,135.90
Experimental investigations, Stony Gorge unit	1,328.35	1,328.35
Storage system:		
East Park Reservoir surveys		4,060.84
East Park Dam, spillway and dikes	[1] $1,725.00	154,002.40
East Park Reservoir, land and clearing		88,469.02
East Park spillway extension		29,470.79
East Park feed canal—		
Excavation		91,186.23
Diversion dam		24,367.01
Headworks		6,704.16
Salt Creek siphon		4,747.74
Terminal chute		5,619.22
Salt Creek chute		3,463.45
County road bridges		2,350.01
Minor structures		3,137.47
Culverts		4,642.93
East Park, raising spillway		11,431.83
East Park feed canal, concrete lining	[1] 390.00	18,211.88
East Park Dam, additional gates		1,338.06
	[1] 2,115.00	453,208.06
Canal system:		
North Canal, purchase and rebuilding		24,600.96
South Canal—		
Purchase and rebuilding		66,869.93
Diversion dam	[1] 14.97	26,060.08
Diversion, conduit		1,707.88
Diversion, headgates		4,242.55
Diversion dam, sluiceway		5,049.76
North Canal—		
Diversion dam		3,908.54
Diversion, headworks		1,237.04
South high line canal, excavation and minor structures		21,172.61
South Canal—		
High line flumes		7,074.97
High line chute		2,178.28
High line, concrete lining		1,899.98
Crossing under Southern Pacific R. R.		673.45
South diversion excavating plant		4,916.21
	[1] 14.97	171,592.24
Lateral system:		
Laterals and sublaterals	428.88	88,424.34
Minor structures—		
Concrete	1,059.32	59,524.04
Pipe	544.94	6,236.37
Timber	79.96	2,185.79
Metal		146.63
1½-inch concrete lining	7,991.63	95,077.68
24-inch pipe line on lateral 12		2,648.51
Railroad crossings under Southern Pacific tracks (7)		6,251.43
	10,104.73	260,494.79
Flood protection, levees and dikes		499.72
Farm units		1,360.59
Permanent improvements:		
Buildings and permanent improvements	544.51	15,042.47
Power line, dismantled		271.72
	544.51	15,314.19
Operation and maintenance during construction	[1] 4,624.43	107,657.23
Plant accounts	4,420.64	5,402.82
Gross construction cost to June 30, 1918	9,643.83	1,020,988.89
Less revenues earned during construction period:		
Rental of buildings		1,054.00
Rental of grazing and farming lands		3,568.00
Rentals of irrigation water		119,090.22
Contractor's freight refunds		1,829.82
Other revenues, unclassified		1,953.47
Profit on hospital operations	[1] 371.05	203.93
	[1] 371.05	127,699.44
Net cost of construction of project to June 30, 1918		893,289.45

[1] Deduct.

Cost statement by calendar years, Orland project.

Year ending Dec. 31—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1906	$7,213.19				$7,213.19
1907	48,106.71				48,106.71
1908	117,351.53				117,351.53
1909	113,988.22				113,988.22
1910	173,159.82	$1,456.88		$1,456.88	174,616.70
1911	74,414.97	11,412.34		11,412.34	85,827.31
1912	16,488.92	18,342.71		18,342.71	34,831.63
1913	29,564.35	17,229.28		17,229.28	46,793.63
1914	177,089.08	19,814.16		19,814.16	196,903.24
1915	95,491.76	19,292.40		19,292.40	114,784.16
1916	34,034.80	24,444.74		24,444.74	58,479.54
1917	14,379.70	[1] 4,332.88	$31,510.96	27,178.08	41,557.78
1918	6,645.79	[1] 2.40	14,856.50	14,854.10	21,499.89
Plant accounts June 30, 1918	5,402.82				5,402.82
Total	913,331.66	107,657.23	46,367.46	154,024.69	1,067,356.35

[1] Deduct.

Cost statement by fiscal years, Orland project.

Year ending June 30—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1906	$276.73				$276.73
1907	10,019.66				10,019.66
1908	126,711.08				126,711.08
1909	59,402.42				59,402.42
1910	199,568.73	$1,356.18		$1,356.18	200,924.91
1911	103,524.38	4,141.36		4,141.36	107,665.74
1912	45,533.68	17,019.73		17,019.73	62,553.41
1913	11,780.79	20,872.72		20,872.72	32,653.51
1914	61,160.78	15,266.26		15,266.26	76,427.04
1915	203,470.40	20,240.24		20,240.24	223,710.64
1916	54,947.66	20,257.74		20,257.74	75,205.40
1917	21,684.91	13,127.43	$12,046.62	25,174.05	46,858.96
1918	14,268.26	[1] 4,624.43	34,320.84	29,696.41	43,964.67
Plant accounts June 30, 1917	982.18				982.18
Total	913,331.66	107,657.23	46,367.46	154,024.69	1,067,356.35

[1] Deduct.

Estimated cost of contemplated work, Orland project, during fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys—Surveys, explorations, etc., Stony Gorge unit		$5,000
Canal system—Concrete lining under supplemental construction		12,000
Lateral system:		
Excavation	$450	
Minor structures (supplemental construction)	1,050	
Concrete lining (supplemental construction)	20,000	
		21,500
Operation and maintenance under public notice		35,000
Hospitals		250
Total		73,750

Operating costs and revenues, Orland project, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works:						
East Park Dam	$1,502.30	$5,140.65	$6,642.95	$2,572.19	$5,936 53	$8,508.72
East Park feed canal	558.97	889.25	1,448.22	1,000.03	957.83	1,957.86
	2,061.27	6,029.90	8,091 17	3,572.22	6,894.36	10,466.58
Canal system:						
North diversion dam	20.22	1.75	21.97	20.22	24.50	44.72
South diversion dam	2.07	12.19	14.26	2.07	75.42	77.49
	22.29	13.94	36.23	22.29	99.92	122.21
Lateral system:						
North side	2,347.40	4,513.12	6,860.52	3,779.54	6,408.31	10,187.85
South side	5,082.36	10,192.64	15,275.00	8,111.98	13,283.12	21,395.10
	7,420.76	14,705.76	22,135.52	11,891 52	19,691.43	31,582.95
Adjudication of water rights along Stony Creek	....	3,999.30	3,999.30	....	3,999.30	3,999.30
Farming operations	....	58.62	58.62	137.80	58.62	196.42
Total	9,513.32	24,807.52	34,320.84	15,623.83	30,743.63	46,367.46

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$26,477.48	$26,477.48
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	.94	.94
Rental of land and buildings during operating period	488.00	727.00
Rentals of irrigation water	240.00	510.00
Other revenues unclassified, earned during operating period	59.78	429.33
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants (contra)	[1] 1,305.28	[1] 1,305.28
Total	25,960.92	26,839.47
Difference (deficit)	8,359.92	19,527.99

[1] Deduct.

COLORADO, GRAND VALLEY PROJECT.

S. O. HARPER, project manager, Grand Junction, Colo.

LOCATION.

County: Mesa.

Townships: 1 N., Rs. 1 E. and 1 to 3 W.; 2 N., Rs. 2 and 3 W.; 1 S., Rs. 1 E. and 1 W., Ute meridian. 9 S., Rs. 101 to 104 W.; 10 S., Rs. 98, 101, and 103 W.; 11 S., Rs. 98 and 99 W., sixth principal meridian.

Railroads: Denver & Rio Grande; Colorado Midland.

Railroad stations and estimated population, June 30, 1918: Palisade, 900; Clifton, 200; Grand Junction, 8,500; Fruita, 1,000; Loma, 25; Mack, 75.

WATER SUPPLY.

Source of water supply: Grand River.

Area of drainage basin: 8,550 square miles above Palisade.

Annual run-off in acre-feet of Grand River, at Palisade, 1902 to 1917: Maximum, 5,446,600; minimum, 2,300,000; mean, 3,892,700.

Discharge in second-feet of Grand River, at Palisade, 1902 to 1917: Maximum, 50,000; minimum, 1,100.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the Service is prepared to supply water, season of 1918: 35,000 acres.

Area under rental contracts season 1918 (to June 30): 16,100 acres.

Length of irrigation season: From April 1 to October 31, 214 days.

Average elevation of irrigable area: 4,700 feet above sea level.

Rainfall on irrigable area: For 25 years, average, 8.27 inches; 1917, 6 inches.

Range of temperature on irrigable area: −15° to 100° F.

Character of soil of irrigable area: Sandy loam, sandy mesas, and adobe.

Principal products: Fruit, sugar beets, alfalfa, grain, vegetables.

Principal markets: Large cities east of Rocky Mountains for fruit; other products, local.

LANDS OPENED FOR IRRIGATION.

One hundred and two farm units were opened to entry on March 29, 1918, on a rental basis. No lands have been opened for irrigation under public notice. All lands irrigated in the project are supplied with water under rental contracts. Dates of orders: January 25, 1917; February 21, 1918.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in September, 1902.

Construction recommended by board of engineers December 15, 1908.

Purchase of rights of way authorized by Secretary November 4, 1911.

Construction authorized by Secretary September 23, 1912.

First irrigation by Reclamation Service season of 1915.

Cooperative drainage work in Grand Valley Drainage District begun March, 1918.

Entire project 69.7 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Grand Valley project provides for the diversion of water from the Grand River by means of a diversion dam located about 8 miles northeast of Palisade, Colo., into a canal system on the north side of the river for the irrigation of lands lying north and west of Grand Junction, Fruita, and Mack, Colo. About 40,000 acres will be supplied by gravity and 10,000 acres by electrically operated pumping plants to be located on the gravity canal. Power for pumping will be developed in a power plant to be located at the upper portal of Tunnel No. 3. On the first 6 miles of the main canal located in the canyon of the Grand River there are three tunnels, respectively, 3,723, 1,655, and 7,292 feet long. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The diversion dam and the first 55 miles of the main canal have been completed. Lateral facilities to serve 35,000 acres of the gravity unit of the project have also been completed, with the exception of a few sublaterals and a large number of turnouts and weirs, which will be installed as needed.

There remain to be completed the last 7 miles of the main canal, laterals to serve 5,000 acres of the gravity unit, the power and pumping systems, and such drainage and flood protection works as may be required.

SUMMARY OF GENERAL DATA FOR GRAND VALLEY PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:			
Irrigable acreage when project is complete			50,000
Public land entered to end of fiscal year		13,305	
Public land open to entry at end of fiscal year		1,701	
Public land withdrawn at end of fiscal year		14,064	
Private land		20,930	
Acreage Service could have supplied season of 1917			35,000
Estimated addition in fiscal year, 1919			[1] 8,350
Estimated acreage Service can supply July 1, 1919			[1] 43,350
Acreage actually irrigated, season of 1917			5,289
Acreage cropped under irrigation, season of 1917			4,523
Crops:			
Value of irrigated crops, season of 1917			$198,960.00
Value of irrigated crops, per acre cropped			$44.00
Finances:			
Net construction cost to end of fiscal year			$3,238,470.63
Per cent complete at end of fiscal year			69.7
Appropriated for fiscal year 1919, total			$348,000
Allotment for construction, fiscal year 1919			$348,000
Estimated per cent complete, June 30, 1919			85.0
Proposed appropriation, fiscal year 1920, for construction			$178,000
Estimated gross construction cost to June 30, 1920			$3,796,000
Estimated per cent complete, June 30, 1920			90.0
Appropriation, fiscal year 1918			[2] $252,703.09
Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$197,009.12		
Transfers	12,868.50		
		$209,877.62	
Registered liabilities chargeable to 1918 appropriation		40,262.86	
			$250,140.48
Unencumbered balance, July 1, 1918			$2,562.61
Repayments:			
Water-rental charges—			
Accrued to end of fiscal year			$25,807.31
Collected to end of fiscal year			$24,423.03
Uncollected at end of fiscal year			$1,384.28
Drainage:			
Estimated acreage damaged by seepage to end of fiscal year			[3] 30,225
Miles of drains built to end of fiscal year:			
Open		3.6	
Closed		.8	
Total			4.4
Estimated acreage protected by drains built to end of fiscal year			725
Estimated acreage to be protected by authorized system			10,200
Cost of drainage works to end of fiscal year			$74,148.30

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[1] Includes lands in Mesa County and Palisade irrigation districts to be supplied under special contracts.

[2] Includes refunds authorized to be added to 1918 appropriation by sundry civil act of June 12, 1917.

[3] Includes 30,000 acres in Grand Valley Drainage District, 225 acres in Project.

CONSTRUCTION DURING FISCAL YEAR.

Grand River Dam.—The only work performed on this feature was the extension of the riprap below the sluiceway channel at the west end of the dam, involving the placing of 50 cubic yards of rock. A considerable amount of second-hand construction equipment which was stored at this point was disposed of during the year.

Main canal.—A 96-foot steel bridge was erected to replace the pile trestle carrying the 60-inch wood-stave siphon across East Salt Creek. Several minor structures were installed at various points on the canal, consisting of 2 lateral headgates, 3 highway bridges, 3 wasteways, and 5 miscellaneous structures. The first 55 miles of the main canal, extending from the headworks to West Salt Creek, has been completed and seasoned throughout its length and is now in regular operation for the delivery of water.

Lateral system.—A number of small extensions were constructed on the lateral system to supply water to new lands. This work involved the excavation of 11,075 cubic yards of earth and the installation of one 12-inch wood-stave siphon 633.5 feet in length. A number of minor wooden structures were installed, consisting of 35 drops and checks, 79 bridges and culverts, 64 turnouts, and 91 weirs. The lateral system required to supply 35,000 acres of the gravity unit of the project is practically completed except for the installation of turnouts and measuring devices.

Permanent improvements.—Permanent buildings for housing the operation and maintenance forces at the two maintenance camps were completed, consisting of 2 dormitories, 2 mess houses, 1 water master's house, and 2 barns, together with water systems and miscellaneous small buildings. Three ditch riders' quarters were also constructed at suitable points on the main canal.

Surveys.—The irrigable area survey of the project was started in July, 1917, with three field parties, and carried on throughout the year. The field work has been completed covering an area of 27,600 acres and farm unit plats prepared covering 5,000 acres of vacant public lands.

NEGOTIATIONS WITH IRRIGATION DISTRICTS.

In October, 1917, a petition was received from the landowners in the Mesa County irrigation district, requesting that arrangements be made to supply this district with water from the project works. The matter of securing water from the project main canal was also taken up by the directors of the Palisade irrigation district. After considerable negotiation, forms of contracts with both districts were drawn up which were acceptable to the Service and to the directors of the districts. The contracts were carried by large majorities at elections held in each district on May 21, 1918.

The supplying of these two districts involves the construction of a feeder line from the project main canal to the canal of the Palisade irrigation district and the installation of a small pumping plant which will utilize the fall in this line to pump the necessary water into the canal of the Mesa County district. A number of headgates will also be installed to supply the major portion of the Mesa County district directly from the project main canal. Under the terms of the contracts the United States will acquire the power water rights of the districts amounting to 1,200 second-feet of the natural flow of the Grand River.

Negotiations are also under way with the Orchard Mesa irrigation district looking toward the taking over and rehabilitation of the irrigation system of this district by the service. No definite progress has been made during the fiscal year, however, on account of the failure of the landowners and bondholders to reach a basis for settlement.

SEEPAGE AND DRAINAGE.

Project lands.—Seepage conditions on the project were as a whole somewhat improved during the year. It is estimated that the area of 250 acres which was affected by seepage on June 30, 1917, has this year decreased to 225 acres. Practically all seepage on the project has been due to leakage through shale cuts in the main canal and not to any general rise of the water table. As a rule the lands which have been affected are of inferior quality, and on account of shallow soil are of little value for farming purposes. To assist in silting up the crevices in shale cuts and in tightening the main canal a silting plant was put in operation in July, 1917, at a location near mile post 35. This plant was operated until the end of the irrigation season with satisfactory results. The natural flow of the Grand River carries at certain seasons a large volume of silt and much benefit also resulted from this source. The wetted perimeter of the main canal throughout practically its entire length is now covered with a water-tight layer of silt several inches in thickness. Little difficulty is anticipated in future from leakage through the shale cuts.

Cooperative drainage in the Grand Valley drainage district.—With the increase of irrigation on the project the need for outlets for drainage and waste water through the lands included in the Grand Valley drainage district has become very urgent. Investigations were made to determine what portion of the drainage system as planned for the district could be used jointly by the project as outlets to conduct waste and seepage water through the lands of the district to the river. After considerable negotiation a contract was entered into between the United States and the district providing for the use by the United States of 47 miles of existing waterways and for the construction of 38 miles of new channels to serve as outlets for the project and drains for the district. The construction of these drains will serve to reclaim a considerable acreage of land in the district as well as provide permanent outlets for the project. The contract provides that the works are to be constructed at the expense of the project but maintained by the district, which also furnishes the rights of way, and the United States is released from all liability on account of waste and seepage water originating on the project.

Construction work on the cooperative system was commenced in March, 1918, with one trenching machine and one drag-line excavator. A second drag-line excavator was put in operation in May. At the end of the fiscal year 0.8 mile of closed drain and 1.9 miles of open drain had been completed, involving the excavation of 69,525 cubic yards of earth. Six highway bridges and six flumes were constructed across the open drains and work is in progress on the railroad crossings to carry these drains under the tracks of the Denver & Rio Grande Railroad.

OPERATION AND MAINTENANCE.

The irrigation system operated during the season of 1917 consisted of the first 55 miles of the main canal and 95 miles of laterals. The acreage actually irrigated amounted to 5,289 acres widely scattered through the project. A total of 18,715 acre-feet of water was delivered to the farms, with a duty of 3.54 acre-feet per acre. Water was furnished on "supply on demand" basis at the regular rate of 40 cents per acre-foot and also at a special rate of 10 cents per acre-foot fixed for all lands which had not previously been cultivated. Four hundred acres of land in the Mesa County irrigation district were also supplied with water under special contracts.

No particular difficulties were experienced in operating the system and water was carried in the main canal throughout the season with no interruption. The usual number of breaks occurred in laterals, due usually to washing out of drops. Considerable trouble was also caused by Russian thistles which thrive on uncultivated lands and blow into the laterals during windstorms, making it difficult at times to maintain uniform deliveries of water.

In June, 1918, the Grand River equaled the highest stage on record, with a discharge of 50,000 second-feet. The Grand River dam withstood the flood successfully and no damage resulted to any of the works of the project.

The operation and maintenance force was employed during the irrigation season in patroling the canals, regulating the delivery of water, performing minor repair work, and installing turnouts and measuring devices. During the nonirrigation season the same force was engaged in cleaning canals and laterals, burning weeds, installing new structures, and performing miscellaneous repair work.

Historical review, Grand Valley project.

Item.	1916	1917	1918
Acreage for which service was prepared to supply water	15,000	35,000	35,000
Acreage irrigated	1,741.5	5,289	[1] 9,000
Miles of canal operated	80	150.5	....
Water diverted (acre-feet)	30,813	55,891	....
Water delivered to land (acre-feet)	4,224	18,715	....
Per acre of land irrigated (acre-feet)	2.42	3.54	....

[1] Estimated

SETTLEMENT.

Settlement on the project during the year has been somewhat disappointing. The water users' association has made an effort to colonize the private lands on the project through an agency in Kansas City, but for a number of reasons, among which are the abnormal conditions due to the war and the extreme scarcity of labor, it has been very difficult to induce farmers to leave their present locations, and the benefit secured from this work has been limited.

On March 29, 1918, 102 farm units, comprising about 5,000 acres of the most desirable of the vacant public lands under the project, were opened to entry in accordance with the Secretary's order of February 21, 1918. Up to the end of the fiscal year 71 of these farm units had been taken, leaving 31 units still open to entry. Although results are not all that could be hoped for, a steady improvement is noted in the settlement and development of the project, and the cultivated area is being materially increased each year. Lands at present are held at reasonable prices, but it is not probable that any marked progress in settling the idle lands will be made until after the close of the war.

Settlement data, Grand Valley project.

Item.	1916	1917	1918
Total number of farms on project	900	900	900
Population	200	480	800
Number of irrigated farms	76	202	301
Operated by owners or managers	50	97	....
Operated by tenants	26	105	....
Population	168	480	....
Number of towns	[1] 6	[1] 6	....
Population	[1] 10,800	[1] 10,700	....
Total population in towns and on farms	[1] 11,000	[1] 11,180	....
Number of public schools	[1] 24	[1] 24	....
Number of churches	[1] 28	[1] 28	....
Number of banks	[1] 7	[1] 7	....
Total capital stock	[1] $387,000	[1] $411,000	....
Amount of deposits	[1] $2,434,761	[1] $2,525,675	....
Number of depositors	[1] 7,260	[1] 7,462	....

[1] These items on lands adjacent to project.

CROPS.

The spring of 1917 was unusually cold and the season was late This left little time for the farmers to get their lands properly prepared and seeded in due season. The cold spring was followed by an extremely dry summer, which made the season very unfavorable for late crops. The total area cropped was 4,523 acres, of which 2,962 acres were new land farmed for the first time this season. In view of this fact the average crop yield of $44 per acre is very satisfactory. Some of the more successful farmers paid the entire purchase price of their land out of this season's crop.

The principal crops produced were sugar beets, wheat, apples, beans, alfalfa, potatoes, corn, oats, and tomatoes. Market conditions and prices were good, and this fact contributed materially to the success of the farmers. The most successful farmers were those who concentrated their efforts on a small acreage of land properly prepared, instead of spreading out over a larger acreage than they could handle. The project farmers are beginning to realize that diversified farming combined with dairying and stock raising will yield the largest returns and nearly all the new settlers are working along these lines.

The crop prospects for the 1918 season are good. The first cutting of alfalfa produced an excellent yield of good quality. The cultivated area has been materially increased this year, and it is estimated that 9,000 acres of land are now under cultivation.

Crop report, Grand Valley project, Colorado, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	409	Ton	1,162	2.8	$13.65	$15,861	$38.78
Alfalfa seed	4	Bushel	30	7.5	7.80	234	58.50
Apples	505	Pound	1,491,925	2,954	.016	23,511	46.54
Barley	64	Bushel	799	12.5	1.39	1,118	17.47
Beans	597	...do	4,576	7.7	5.03	23,044	38.60
Beets, sugar	456	Ton	4,822	10.6	7.00	33,754	74.02
Corn, Indian	343	Bushel	6,958	20.3	1.92	13,333	38.87
Corn, fodder	335	Ton	845	2.5	5.40	4,562	13.62
Fruits, small	4	Pound	4,300	1,075	.049	213	53.16
Garden	28					1,747	62.39
Hay	193	Ton	120	.6	13.30	1,596	8.27
Millet seed	20	Bushel	133	6.7	1.80	240	11.97
Oats	631	...do	11,145	17.7	.91	10,120	16.03
Onions	3	...do	328	109.3	1.83	600	200.00
Pasture	65					654	10.06
Peaches	39	Pound	260,329	6,675	.029	7,478	191.76
Pears	110	...do	293,944	2,672	.021	7,213	65.58
Potatoes, white	171	Bushel	13,826	80.9	1.12	15,480	90.51
Rye	2	...do	30	15	1.80	54	27.00
Straw	1,552	Ton	776	.5	4.00	3,104	2.00
Wheat	857	Bushel	13,095	15.3	2.01	26,345	30.74
Tomatoes	73	Ton	572	7.8	10.00	5,720	78.36
Beet tops	456					2,355	5.16
Miscellaneous	46					624	13.57
Less deplicated areas	2,440						
Total cropped	4,523	Total and average				198,960	44.00

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Irrigable area farms reported	8,363	202	16.7
Nonbearing orchard	145	Irrigated area farms reported	5,289	202	10.6
Young alfalfa	370	Under rental contracts	5,289	202	10.6
Ground, fall plowed	968	Cropped area farms reported	4,523	193	9.0
Less duplicated areas	717				
Total other purposes	766				
Total irrigated	5,289				

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[1] Estimated, 50,000 acres.

PUBLIC NOTICES AND ORDERS.

ORDER, FEBRUARY 21, 1918.

1. **Public lands for which entry may be made and water is available.**—In pursuance of the reclamation act of June 17, 1902 (32 Stat., 388) and acts both amendatory thereof and supplementary thereto, particularly sections 1, 10, and 11 of the reclamation extension act of August 13, 1914 (38 Stat., 686), it is announced that water is available and entry may be made in accordance with this notice, for the irrigable unentered public lands under the Grand Valley project, Colorado, shown on farm-unit plats of the following townships of the Ute and sixth principal meridians, to wit:

T. 1 N., R. 1 W., U. M.
T. 2 N., R. 2 W., U. M.
T. 2 N., R. 3 W., U. M.
T. 9 S., R. 103 W., 6 P. M.
T. 9 S., R. 104 W., 6 P. M.

which plats were approved by the Secretary of the Interior on February 9, 1918, and are on file in the office of the project manager, United States Reclamation Service, Grand Junction, Colo., and at the local land office at Montrose, Colo.

2. **When and how to make entry for public land.**—Homestead entries for farm units shown on said plats may be made by persons holding approved water-rental applications therefor, on and after 9

o'clock a. m., March 29, 1918, at the local land office at Montrose, Colo. Every person desiring to acquire any of said public land must execute a water-rental application upon form provided for that purpose and accompany the same by payment of $3 per acre for each irrigable acre in the farm unit. Each water-rental application must be for a specified farm unit and more than one person may make such application for the same farm unit, but not more than one water-rental application can be made by the same person. Such water-rental application must be made to the project manager, United States Reclamation Service, Grand Junction, Colo., in person, by mail, or otherwise within a period of six days beginning March 23, 1918, to and including 9 o'clock a. m., March 29, 1918. Water-rental applications received after said period of six days will be filed and noted in the order of their receipt.

3. **Simultaneous filing of water-rental applications.**—Water-rental applications made and filed with the project manager, United States Reclamation Service, Grand Junction, Colo., during said six-day period will be held and treated as simultaneously filed, and the project manager will dispose of them as follows:

(*a*) Where there is no conflict the water-rental application will be approved.

(*b*) Where there are two or more water-rental applications for the same farm unit the project manager will write on cards the names of the several water-rental applicants, and each of those cards containing the name of one such applicant will be placed in an envelope upon where there is no distinctive or identifying mark, and at 2 o'clock p. m., March 29, 1918, after all the envelopes containing the names of the several water-rental applicants shall have been thoroughly mixed in the presence of such persons as may desire to be present, they will be drawn and numbered in order. The cards as drawn and numbered will be securely fastened to the water-rental applications of the respective persons, and the water-rental applications will be allowed in such order.

To each water-rental applicant first in order among those applying for the same farm unit, the project manager will issue a water-rental application duly approved showing payment of the water-rental charge as herein provided, which will entitle such water-rental applicant to file homestead application at said local land office, Montrose, Colo., for the farm unit described in his water-rental application. Such homestead application should be made within three days from date of approval of water-rental application. Failure to so make such homestead application, entitles the water-rental applicant next in order for the same unit to have his water-rental application approved by the project manager entitling him to make homestead application, this procedure continuing if necessary as to all applicants. No part of a payment made will be returned to a successful applicant in any case, if he be a qualified homestead entryman.

4. **Failure of applicant to obtain public land applied for.**—Where any applicant fails to obtain land applied for by him he will be permitted to elect whether he will amend his application to embrace other lands not affected by pending applications and otherwise subject thereto when such amended application is presented, or withdraw his original application without prejudice. In the event of such withdrawal the water rental charges deposited will be returned by the project manager upon surrender of his receipt.

5. **Warning against unlawful settlement upon public land.**—No person will be permitted to gain or exercise any right whatever under any settlement or occupation of any of said public lands, begun without a valid approved water-rental application covering the lands in question, provided, however, that this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

6. **Limit of area for which entry may be made.**—The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such lands, is fixed as shown upon the plats for the several farm units.

7. **Water-rental charge.**—The initial payment of $3 per acre will be credited as payment of a minimum charge of $1 per irrigable acre for the years 1918, 1919, and 1920, payment of which will entitle the entryman to one dollar's worth of water each of said years, at the rate fixed by the Secretary of the Interior for similar lands on the project. Additional water will be furnished at the same rate as established for water deliveries to other lands in the project. The charges herein provided will be made against each acre of irrigable land in the farm unit whether water is used thereon or not, and no part of the initial payment of $3 per irrigable acre will be refunded at the termination of the three-year period. Future charges will be announced by further order or by public notice. Said minimum water-rental charge of $3 per irrigable acre will be required to be deposited in advance by the prospective entryman upon executing water-rental application before making application for entry in accordance with the terms of this order.

8. **Water users' association.**—The successful applicant after making homestead application will be required to subscribe the land embraced in his farm unit to the Grand Valley Water Users' Association.

9. **Water-right application under public notice.**—Within three months after date of public notice, hereafter to be issued for the lands described in said farm-unit plats, each entryman must make a formal water-right application covering his farm unit, in accordance with the terms of such notice and the last proviso of section 1 of said reclamation extension act. Upon failure so to do, the Secretary of the Interior may, at his option, cancel the entry in question with all rights acquired thereunder.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Grand Valley project, June 30, 1918.

Cash		$45.90
Inventory of stock on hand		62,280.15
Accounts receivable		1,547.03
Construction work contracted		103.00
Construction cost	$3,269,387.64	
Less construction revenue earnings	30,917.01	
		3,238,470.63
Total		3,302,446.71
Accounts payable		40,393.94
Contingent obligations		148.00
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	$3,358,565.61	
Collection, transfer, refund, and joint construction vouchers issued	96,660.84	
Net investment		3,261,904.77
Total		3,302,446.71

Feature costs of Grand Valley project to June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys, project	[1] $3,843.04	$70,703.65
Pumping for irrigation, surveys	2,749.02	5,726.89
Canal system:		
Grand River diversion dam	[1] 13,324.77	500,436.87
Canyon division, headworks to Palisade	[1] 9,271.59	988,282.10
Division No. 2, Palisade to Indian Waste	[1] 145.48	474,138.78
Division No. 3, Indian Waste to Little Salt Wash	[1] 705.06	292,346.79
Division No. 4, Little Salt Wash, to end	14,523.38	344,178.02
	[1] 8,923.52	2,599,382.56
Lateral system:		
District No. 1, Indian Waste to Big Salt Wash	6,335.86	131,776.33
District No. 2, Big Salt Wash to East Salt Creek	7,178.08	111,281.63
District No. 3, East Salt Creek to West Salt Creek	9,841.96	66,633.80
	23,355.90	309,691.76
Drainage system:		
Project—		
Surveys	1,093.22	7,117.56
Drains	901.99	1,465.01
Grand Valley drainage district—Surveys and plans for complete system	203.45	25,383.58
Cooperative drainage in Grand Valley drainage district—		
Surveys and contract payments	13,753.93	14,532.10
Open drains	11,119.07	11,119.07
Closed drains	14,530.98	14,530.98
	41,602.64	74,148.30
Flood protection—Protecting wasteway channels	2,099.42	12,480.91
Farm units—Survey of irrigable lands	21,110.38	24,797.74
Permanent improvements:		
Maintenance camp No. 5	4,187.72	4,187.72
Maintenance camp No. 7	5,627.32	5,627.32
Ditch riders' quarters	3,538.62	3,538.62
Miscellaneous buildings	[1] 471.40	801.25
	12,882.26	14,154.91
Telephone system, project	....	11,794.30
Operation and maintenance during construction (water rental)	54,578.37	88,533.78
Balance in plant and clearing accounts on June 30, 1918	40,683 09	57,972.84
Gross construction cost to June 30, 1918	186,294.52	3,269,387.64
Less revenues earned during construction period;		
Rental of buildings	296.27	2,061.34
Rental of grazing and farming lands	[1] 13.00	1,463.74
Rentals of irrigation water	20,846.66	25,807.31
Rentals of telephones and tolls	....	15.65
Contractors' freight refunds	5,301.73	7,801.73
Other revenues, unclassified	124.01	401.74
Profit on hospital operations	579.31	4,356.60
Losses on operations, unclassified	[1] 7,478.29	[1] 10,991.10
	19,656.69	30,917.01
Net cost of construction of project to June 30, 1918	....	3,238,470.63

[1] Deduct.

Cost statement by calendar years, Grand Valley project.

Year ending Dec. 31—	Construction.	Operation and maintenance during construction.	Total cost.
Period prior to Dec. 31, 1911	$82,366.98	....	$82,366.98
1912	245,449.57	....	245,449.57
1913	432,928.81	....	432,928.81
1914	1,058,596.01	....	1,058,596.01
1915	838,600.39	....	838,600.39
1916	277,225.60	$19,458.25	296,683.85
1917	119,338.33	48,150.61	167,488.94
January to June 30, 1918	68,375.33	20,924.92	89,300.25
Plant and clearing accounts to June 30, 1918	57,972.84	....	57,972.84
Total	3,180,853.86	88,533.78	3,269,387.64

Cost statement by fiscal years, Grand Valley project.

Year ending June 30—	Construction.	Operation and maintenance during construction.	Total cost.
Prior to June 30, 1912	$265,461.64		$265,461.64
1913	188,772.93		188,772.93
1914	668,889.51		668,889.51
1915	1,357,472.93		1,357,472.93
1916	324,814.92	$4,650.40	329,465.32
1917	226,436.03	29,305.01	255,741.04
1918	131,716.15	54,578.37	186,294.52
Plant and clearing accounts to June 30, 1917	17,289.75		17,289.75
Total	3,180,853.86	88,533.78	3,269,387.64

Estimated cost of contemplated work, Grand Valley project, during fiscal year 1919.

Features.	Subfeature.	Principal feature.
Examination and surveys		$500
Pumping for irrigation		2,000
Canal system:		
Surveys	$125	
Canal excavation	500	
Minor structures	375	
Feeder, pumping plant, and structures for supplying Palisade and Mesa County irrigation districts	40,000	
		41,000
Lateral system:		
Surveys	250	
Lateral excavation	2,250	
Minor structures	7,500	
		10,000
Drainage system:		
Project—		
Surveys	2,000	
Drains	4,300	
Total project	6,300	
Cooperative work in Grand Valley drainage district—		
Surveys	3,000	
Open drains	80,700	
Closed drains	63,300	
Bridges	25,000	
Flumes	8,000	
Minor structures	30,000	
Total cooperative work	210,000	
		216,300
Flood protection:		
Surveys	1,000	
Protective work on wasteway channels	9,000	
		10,000
Power system—Surveys		1,000
Farm units—Surveys		10,000
Permanent improvements—Buildings, ditch riders' quarters		5,000
Telephone system		200
Operation and maintenance (water rental):		
Operation	20,850	
Maintenance	31,000	
		51,850
Reimbursable accounts		150
Total		348,000

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

F. D. PYLE, project manager, Montrose, Colo.

LOCATION.

Counties: Montrose and Delta.

Townships: 15 S., Rs. 94 to 96 W., sixth principal meridian; 48 to 51 N., Rs. 7 to 12 W., New Mexico meridian.

Railroad: Denver & Rio Grande.

Railroad stations and estimated population June 30, 1918: Montrose, 3,600: Olathe, 650; and Delta, 2,700.

WATER SUPPLY.

Sources of water supply: Gunnison and Uncompahgre Rivers.

Area of drainage basins: Gunnison River, 3,850 square miles; Uncompahgre River, 500 square miles.

Run-off in acre-feet, April to October, inclusive, Gunnison River at River Portal (3,850 square miles), 1905 to 1917: Maximum, 1,737,300; minimum, 884,550; mean, 1,345,500. Uncompahgre River at Colona, near Fort Crawford (500 square miles), 1903 to 1917: Maximum, 256,700; minimum, 128,700; mean, 173,800.

LANDS OPENED FOR IRRIGATION.

On January 8, 1918, five farm units were made subject to departmental order of June 30, 1916, and thus made subject to entry to those holding preferential rights. Departmental order of February 21, 1918, opened to entry 116 farm units on April 5, 1918. All lands irrigated from canals operated by the Reclamation Service were furnished water under rental contracts, except in a few instances where water was appurtenant to outstanding stock or deeds issued by canal companies whose properties had been transferred to the Government.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1918: Estimated at 100,000 acres.

Area under rental contracts, season of 1918: Estimated at 80,000 acres.

Area irrigated, season of 1917: 53,108 acres.

Length of irrigating season: From April 1 to October 31, 214 days, on all Government canals except the Loutsenhizer, under which the season ends November 15.

Average elevation of irrigable area: 5,500 feet above sea level.

Rainfall on irrigable area: 18 years, average 9.45 inches; 1917, at Montrose, 7.76 inches.

Range of temperature on irrigable area: −25° to 98° F.

Character of soil of irrigable area: Red sandy gravel, adobe, and clay loam.

Principal products: Alfalfa, grain, fruits, sugar beets, potatoes, onions, and vegetables.

Principal markets: Denver, Omaha, and Kansas City for live stock; Denver, Missouri River points, and Texas for fruit, potatoes, and onions; local mining camps for garden truck and small fruits.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in June, 1901.
Construction recommended by director March 7, 1903.
Construction conditionally authorized by Secretary, March 14, 1903.
Construction authorized by Secretary, June 7, 1904.
Contract for construction of Gunnison Tunnel approved October 18, 1904.
First irrigation by Reclamation Service, season of 1908.
Gunnison Tunnel completed for present use June, 1910.
Gunnison River diversion dam completed January, 1912.
Entire project 96.6 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan for the Uncompahgre Valley project provides for the diversion of water from the canyon of the Gunnison River by means of a tunnel 6 miles long and a canal 11 miles long to supplement the flow of the Uncompahgre River, and in addition thereto the utilization of all waste, seepage, spring, percolating, and return water arising within the project, in the irrigation of lands within the Uncompahgre Valley. To distribute the waters of the Uncompahgre and Gunnison Rivers thus combined, 7 other canal systems were constructed, all of which take water from the Uncompahgre River, except the West Canal, which can divert water from the South Canal by a flume over the Uncompahgre River or can divert from the Uncompahgre River by a feeder canal. The construction of the various canal systems included the purchase, enlargement, and extension of the more important private ditches acquired by the United States.

Surveys and diamond-drill investigations for Taylor Park Reservoir have been completed, but no construction work has been undertaken. The Gunnison Tunnel is complete, except for the construction of two gatehouses at East Portal. The South, West, Montrose & Delta, Loutsenhizer, Selig, Ironstone, East, and Garnet canal systems are complete except for the excavation, enlargement, and extension of a few small laterals and the installation of minor structures. Purchase has been made of over 80 per cent of the Loutsenhizer water rights and of shares pertaining to the Ironstone and Ironstone Extension Canals.

SUMMARY OF GENERAL DATA FOR UNCOMPAHGRE PROJECT, TO END OF FISCAL YEAR 1918.

Areas:			
Irrigable acreage when project is complete			100,000
Public land entered to end of fiscal year		19,157	
Public land open to entry at end of fiscal year		3,100	
Public land withdrawn at end of fiscal year		1,772	
Private land		75,971	
Acreage service could have supplied season of 1917			90,000
Additional in fiscal year 1918			10,000
Estimated acreage service can supply July 1, 1919			100,000
Acreage actually irrigated, season of 1917			53,108
Acreage cropped under irrigation, season of 1917			52,717
Crops:			
Value of irrigated crops, season of 1917			$3,051,668.00
Value of irrigated crops per acre cropped			$57.89
Finances:			
Net construction cost to end of fiscal year			$6,554,464.75
Per cent complete at end of fiscal year			96.6
Appropriated for fiscal year 1919, total			$185,000.00
Allotment for construction, fiscal year 1919			$148,000.00
Estimated per cent complete, June 30, 1919			98.5
Proposed appropriation, fiscal year 1920, for construction			$191,100.00
Estimated gross construction cost to June 30, 1920			$7,506,000.00
Estimated per cent complete, June 30, 1920			99.5
Appropriation, fiscal year 1918		$398,000.00	
Increase under 10 per cent provision of act		30,000.00	
Total appropriation			$428,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$357,492.91		
Transfers	23,529.91		
		$381,022.82	
Registered liabilities chargeable to 1918 appropriation		22,215.02	
Contract obligations wholly covered by 1918 appropriation		7,369.49	
			410,607.33
Unencumbered balance, July 1, 1918			17,392.67

Repayments—Water-rental charges:	
Accrued to end of fiscal year	$585,865.41
Collected to end of fiscal year	585,865.41

Drainage:	
Estimated acreage damaged by seepage to end of fiscal year	16,000
Cost of drainage works to end of fiscal year	$3,831.74

CONSTRUCTION DURING FISCAL YEAR.

Taylor Park Reservoir.—Hydrographic investigations were continued.

Gunnison Tunnel.—During the winter of 1917–18 the concrete work in connection with the tunnel was complèted. Four short sections, totaling 137 linear feet, were lined, walls and roof, as follows:

From station—	To station—	Linear feet.
94+60	94+83	23
96+10	96+38	28
100+23	100+50	27
102+46	103+05	59

Side wall lining, totaling 891 linear feet, was placed as follows:

From station—	To station—	Linear feet.
2+09	7+09	500
22+81	23+54	73
42+42	43+33	91
93+42	94+45	103
103+20	104+44	124

Twenty-two conversions from lined to unlined sections, or vice versa, were constructed at the following stations: 7+09; 22+46; 26+90; 34+03; 34+19; 42+21; 43+66; 57+05; 59+49; 61+56; 62+25; 66+92; 67+53; 82+08; 84+08; 87+93; 88+91; 91+90; 96+62; 99+90; 162+98; and 167+12. After the completion of the above work, requiring the placing of 1,452 cubic yards of concrete, there remained a total of 12,472 linear feet of unlined tunnel divided into 15 sections, varying in length from 207 to 2,004 feet. The effective cross section of the unlined section was materially increased by careful trimming, 573 cubic yards of rock being removed. The above work completes the tunnel, as it was not deemed necessary to line the remaining unlined portions. A wooden bulkhead was constructed at the junction of the incline at River Portal with the tunnel.

On maintenance work 849 feet of bulging side walls were removed and replaced from the floor to the spring line; 101 four-foot concrete bays were placed, and 541 linear feet of bulging floor were removed and replaced, requiring a total of 1,194 cubic yards of concrete.

Power houses and other equipment at East Portal were moved to West Portal and a considerable amount of old equipment was disposed of. A number of old buildings at Lujane were sold at auction.

South Canal system.—A concrete conversion section was constructed in a short earth section in order to increase the safety of the canal and increase its capacity. The structure was rectangular in form and required 250 cubic yards of concrete. Work on a concrete headgate, having a 4 by 5 foot cast-iron gate, located in the South Canal to feed the high line lateral near Dry Cedar Creek, was 50 per cent completed and work was commenced on the construction of a similar gate near the South Canal outlet to feed the upper portion of the high line lateral. Two feeder laterals to the high line were excavated, 2,953 cubic yards of class 1 material being moved under field contract with L. B. Little & E. T. Berry, dated February 28, 1918. The contract was completed on May 20, 1918. Ten drops, 3 culverts, and 2 bridges, all timber structures, were completed.

West Canal system.—One culvert and 5 farm turnouts, all timber structures, were completed.

Montrose and Delta Canal system.—One bridge, 5 checks, 1 drop, 31 farm turnouts, 2 wasteways, 5 weed screens, and 4 weirs, all timber structures, were completed.

Loutsenhizer Canal system.—Five drops and 7 farm turnouts, all timber structures, were completed. The acquisition of outstanding water rights was continued.

Selig Canal system.—Seven bridges, 4 checks, 15 drops, 1 flume, 21 farm turnouts, and 1 weir, all timber structures, were completed.

Ironstone Canal system.—The work of enlarging the California Mesa lateral system was completed by Government forces; 35,043 cubic yards were excavated. This work was very difficult on account of trees, brush, gravel, mud, frost, and the necessity of doing the work between irrigation seasons. After a considerable discussion, the water users' association approved the construction of the Ironstone extension lateral. This lateral is being excavated under field contracts as follows:

Schedule.	Cubic yards.	Contractor.	Date of contract.	Date of completion.
4	6,725	John J. Halliday	Apr. 29, 1918	June 1, 1918.
5	5,878	R. E. Wear	May 7, 1918	June 21, 1918.
6	4,384	John J. Halliday	May 18, 1918	June 12, 1918.
7	[1] 5,100	E. T. Berry	May 16, 1918	Not completed.
8 and 9	[1] 8,250	do	May 27, 1918	Do.

[1] Estimated.

Condemnation proceedings were necessary in order to obtain a portion of the right of way; the remainder was either subject to right of way or was purchased. The following minor structures were completed: 125 drops, 2 checks, 1 wasteway, 3 culverts, 6 lateral turnouts, 117 farm turnouts, 44 bridges, 9 flumes, 20 measuring devices, and 2 weed screens. The acquisition of outstanding shares of Ironstone and Ironstone Extension stock was continued.

East Canal system.—One bridge, 4 checks, 1 culvert, 1 drain, 2 drops, 20 farm turnouts, 1 wasteway, and 4 weirs, all timber structures, were completed.

Garnet Canal system.—Three timber drops were completed.

Drainage system.—Observation of the fluctuation of the water level in the drainage test wells was continued, three sets of observations being made.

Farm units.—Farm unit plats were prepared and were approved by the department on February 20, 1918.

Restorations.—Approximately 61,700 acres of land, withdrawn under first and second forms in connection with the project, were restored to entry by departmental order of September 4, 1917. Only lands included within the possible extensions of the project and lands needed for construction purposes are still withdrawn.

SEEPAGE AND DRAINAGE.

Considerable areas in the Uncompahgre Valley are suffering from an excess of ground water largely caused by excessive and careless use of irrigation water. This condition is no doubt aggravated by the system in use of furnishing water on a continuous flow basis. Seeped areas contain excessive quantities of alkali and are not confined to the river bottoms or other low areas. About 7,200 acres have been drained in the valley. Some of this work was accomplished by individual farmers, but all the larger undertakings were carried through by drainage contractors. The cost of drainage varies from $25 to $75 per acre, depending upon the distance the tile has to be carried to secure an outlet.

Preliminary drainage surveys were begun during the spring of 1915 but no drainage construction has been undertaken by the service.

BOARD AND OTHER REPORTS.

Date.	Subject.	Personnel.
1917.		
Aug. 20	Irrigable area	Elwood Mead.
Oct. 25	Completion and repairs, Gunnison Tunnel	D. C. Henny, R. F. Walter, Fred D. Pyle.

OPERATION AND MAINTENANCE.

During the season of 1917 the service supplied and distributed water for the irrigation of 53,108 acres of land, 4,201 acres of which were supplied from the South Canal system; 4,122 acres from the West Canal system; 18,184 acres from the Montrose and Delta Canal system; 4,100 acres from the Loutsenhizer Canal system; 5,536 acres from the Selig Canal system; 10,811 acres from the Ironstone Canal system; 4,688 acres from the East Canal system; and 1,466 acres from the Garnet Canal system. The Logan and North Mesa Canals, the owners of which have entered into agreements to transfer them to the United States, were supplied with Gunnison water. Gunnison water was also rented to the Ouray Ditch.

During the season 368,148 acre-feet of water were diverted into the canals operated by the service, of which 316,365 acre-feet were delivered to land. All water was furnished on the continuous flow rental basis. The charge was $80 per second-foot for the season for all consumers under all canal systems, except as noted below. The consumers under the Loutsenhizer, Selig, and East Canal systems, who possessed water rights in the old Loutsenhizer Ditch, were furnished at the rate of $20 per second-foot for Uncompahgre priority water and $60 additional per second-foot for supplemental Gunnison water. A few consumers under the Montrose & Delta Canal system were furnished Uncompahgre priority water at rates varying from $36 to $40 per second-foot depending upon the terms of the contracts they held with the Montrose & Delta Canal Co. at the time of its purchase by the Government. The water appurtenant to the stock of the Ironstone Canal Co. was carried for $5 per share; Ironstone Extension stock for $3 per share; Delta Chief, $2; Homerun, $1.50; and Chipeta, 25 cents per share. Private canals were furnished Gunnison water at the South Canal outlet at the rate of $60 per second-foot for the season. Water was diverted into the Chipeta-Beaudry Ditch from the Garnet Canal under informal contract for $100 for the season. All water rentals were paid in advance.

Except for disintegration of concrete in the South Canal lining and the Montrose and Delta slides, no particular difficulties were experienced in operating and maintaining the system during the 1917 irrigation season. The routine work consisted of cutting brush from canal banks, spading laterals, removing weeds after wind storms, protecting the headgates during high water, removing gravel near the headgates of the canals, raising banks, and replacing structures.

In May, 1917, a bad slide occurred below the Ironstone Canal, west of Olathe, and water was turned out four days to excavate and puddle a crack in the bottom of the canal about 150 feet long and 1 to 4 inches wide. During June and July considerable work was done on the Montrose and Delta slides, but there was no interference with the carrying of water. July 23, 1917, a hole 15 by 20 feet and 5 feet deep was found in the concrete lining of the South Canal below a drop near milepost 3, where alkali action had disintegrated the concrete. July 29, 1917, the King lateral extension broke on the west side of Coal Creek and repairs were completed the evening of August 1. During August and September it was necessary to turn the water out of the South Canal four times to repair holes in the concrete lining. A bad slide commenced developing on the Montrose and Delta Canal during the first part of August, and by the middle of August it was necessary to reduce the head of water from 400 to 260 second-feet, where it was maintained until the last of the month, when it became necessary to turn out all water and place as many teams on the work as possible. Only about 30 teams could be obtained, and the canal was not repaired until September 9. November 1 a camp was established and permanent repairs completed in January. The work was very expensive, being located on a steep hillside and the material moved being heavy gravel, shale, and mud. This slide was probably caused in part by the irrigation of land on the mesa above the slide, and arrangements have been made for the purchase of a portion of this land to prevent its further irrigation.

The only flood of the season occurred on the East lateral system, where six wooden drops were washed out. In October and November seven drops on the South Canal between mileposts 3 and 4 were pumped out and all gravel and bowlders removed. An inspection showed that in nearly every drop the bowlders had worn holes from 3 to 4 inches deep in the side walls in the downstream corners of the wells. Six drops were repaired by concreting heavy walls protecting the downstream faces of the wells. Some floor between the drops was also replaced. In April two drops near West Portal were also repaired in a similar manner. A considerable amount of gravel was hauled for concrete repair work, but owing to labor conditions and the necessity of pushing the work in the tunnel very little of the repair work was accomplished, except as mentioned above on the drops.

During the winter of 1917–18 extensive repairs were made to the Gunnison Tunnel by the construction of 101 concrete bays, the removal and replacing of 849 feet of bulging side walls, and the repairing of 541 linear feet of bulging floor.

In the spring of 1918 steel rails were driven above the Montrose and Delta headworks in order to protect them from high water. In March, 1918, a bad slide developed on the Ironstone Canal, west of Olathe, and it became necessary to construct a wooden flume 850 feet long, 20 feet wide, and 5 feet deep. On June 23 a flood, caused by heavy rains, occurred in the King lateral extension, resulting in the failure of a 32-foot section of metal flume.

During the irrigation season the operating force was employed in regulating the distribution of water and in making minor repairs. During the remainder of the year, weather permitting, the same force was engaged in cleaning the canals of vegetation and deposits of sand and gravel and in repairing and installing minor structures.

Historical review, Uncompahgre Valley project.

Item.	1913	1914	1915	1916	1917	1918[1]
Acreage for which Service was prepared to supply water	48,000	52,338	62,147	77,713	90,000	100,000
Acreage irrigated	31,428	38,873	41,463	49,273	53,108	58,000
Miles of canal operated	228	279.5	355.8	405.45	415	420
Water diverted, acre-feet	182,191	183,342	264,060	329,564	368,148	400,000
Water delivered to land, acre-feet	160,056	171,268	231,271	299,432	316,365	348,000
Per acre of land irrigated, acre-feet	5.09	5.06	5.56	6.08	5.96	6.00

[1] Estimated.

SETTLEMENT.

The Department of the Interior, by order of June 30, 1916, opened to entry 5 farm units on which preferential rights were held. Departmental order of February 21, 1918, opened to entry 116 farm units on April 5, 1918, by a drawing at the local land office. There were 160 contestants and 29 farm units filed on at that time. On June 30, 1918, there were still 77 farm units open to entry. Fair progress has been made by the entrymen in developing their lands.

An agreement between the United States and the water users' association, executed on May 7, 1918, provides for operation and maintenance of the project at cost to water users and deferment of the first construction charge until December 1, 1922.

Mr. H. A. Lindgren, project agricultural advisor, continued his work with considerable success in connection with the promotion of feeding, milking tests, and the importation of high grade and registered stock. There is no experimental farm on the project, but considerable interest is manifested in the experimental work of the Colorado Agricultural College. Specialists have been sent out by the United States Department of Agriculture, the Colorado State Agricultural College, and the Agricultural department of the Denver & Rio Grande Railroad Co. to effect permanent organizations in the principal farming communities in the interest of better farming. Domestic science, corn, potato, pig, and other clubs have been organized in the district schools, their work being supervised by the professor of agriculture in the Montrose County High School. The granges of the valley are doing good work in securing better prices for products raised and in promoting better farming. Products of the valley have been exhibited at various fairs held in Denver, Pueblo, Chicago, and El Paso, and many premiums have been awarded to the exhibitors of agricultural products and live stock. The annual Western Slope Fair held in Montrose during September was very successful and the live-stock auction, which was held in connection with it for the first time, also proved very successful and will no doubt be continued in the future. Montrose and Delta Counties have both secured the services of county agents.

Settlement data, Uncompahgre Valley project.

Item.	1913	1914	1915	1916	1917
Total number of farms on project	1,344	910	1,107	1,320	1,402
Population	4,265	2,942	3,561	4,403	4,613
Number of irrigated farms	1,344	910	1,107	1,320	1,402
Operated by owners or managers	839	551	615	713	809
Operated by tenants	505	359	492	607	593
Population	4,265	2,942	3,561	4,403	4,613
Number of towns	3	3	3	3	3
Population	6,400	6,500	6,500	6,700	6,950
Total population in towns and farms	10,665	9,442	10,061	11,103	11,563
Number of public schools	22	22	24	26	26
Number of churches	22	26	26	27	27
Number of banks	(1)	8	8	8	8
Total capital stock	(1)	$360,000	$360,000	$360,000	$515,700
Amount of deposits	(1)	$1,692,612	$1,556,963	$2,750,000	$4,858,903
Number of depositors	(1)	5,950	5,975	8,100	9,500

[1] No data.

CROPS.

The season of 1917 was one of good crops, except for berries, apples, and sugar beets, and one of excellent prices, except where potatoes and onions were stored, so that the general prosperity of the farmers was materially improved. This resulted in improvements to farms, payment of mortgages, and a large increase in bank deposits. There was a large increase in the acreage of beans, onions, potatoes, and wheat due to the program carried out by the State and national organizations for greater crop production. The prices received for alfalfa hay, oats, onions, potatoes, and wheat in 1917 were about 100 per cent larger than for the years 1915 and 1916. Labor was scarce and high priced, but this condition did not seriously affect the production of the crops. A heavy frost on October 18 destroyed about 60 per cent of the apple crop and affected the small percentage of potatoes and onions remaining in the fields.

Crop report, Uncompahgre project, Colorado, 1917.

Crop.	Acres.	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	19,436	Ton	54,057	2.8	$12.05	$651,608	$33.53
Alfalfa seed	38	Bushel	104	2.7	8.71	906	23.84
Apples	2,350	Pound	12,760,850	5,430	.014	180,657	76.62
Barley	377	Bushel	9,989	26.5	1.37	13,682	36.29
Beans	1,951	...do	21,770	11.2	5.11	111,342	57.07
Beets, sugar	1,310	Ton	10,954	8.4	7.15	78,323	59.79
Clover hay	110	...do	125	1.1	10.19	1,263	11.48
Clover seed	48	Bushel	120	2.5	6.38	766	15.96
Corn, Indian	1,419	...do	39,864	28.1	1.47	58,653	41.33
Corn, fodder	254	Ton	1,457	5.7	8.62	12,556	49.43
Corn, ensilage	382	...do	2,773	7.3	8.45	23,426	61.32
Fruits, small	69	Pound	139,750	2,026	.053	7,472	108.29
Garden	115	....	....	....	....	10,313	89.68
Hay	376	Ton	447	1.2	10.27	4,590	12.21
Oats	5,640	Bushel	164,302	29.1	.82	135,520	24.03
Onions	570	...do	147,575	259	1.19	175,896	308.59
Pasture	2,241	....	....	....	....	18,082	8.07
Peaches	128	Pound	795,250	6,213	.017	14,192	110.87
Pears	6	...do	18,560	3,093	.042	771	128.50
Peas	10	Bushel	280	28	2.57	720	72.00
Prunes	12	Pound	30,750	2,562	.024	730	60.83
Potatoes, white	5,940	Bushel	1,315,382	221	.81	1,070,965	180.30
Rye	28	...do	579	20.7	1.48	856	30.57
Wheat	10,405	...do	247,427	23.8	1.90	472,111	45.37
Miscellaneous	68	....	....	....	....	6,877	101.12
Less duplicate areas	566	....	....	....	....	....	....
Total cropped	52,717	Total and average				3,051,668	57.89

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Irrigable area of farms reported	70,437	1,402	70
Nonbearing orchard	274	Total irrigated area of farms reported	53,108	1,402	53
Young alfalfa	2,890	Under rental contracts	53,108	1,402	53
Ground, fall plowed	1,727	Total cropped area of farms reported	52,717	1,402	53
Miscellaneous	1				
Less duplicated areas	4,501				
Total irrigated	53,108				

PUBLIC NOTICES AND ORDERS.

ORDER FEBRUARY 21, 1918.

1. **Public lands for which entry may be made and water is available.**—In pursuance of the reclamation act of June 17, 1902 (32 Stat., 388), and acts both amendatory thereof and supplementary thereto, particularly sections 1, 10, and 11 of the reclamation extension act of August 13, 1914 (38 Stat., 686), it is announced that water is available and entry may be made in accordance with this notice, for the irrigable unentered public lands under the Uncompahgre Valley project, Colorado, shown on farm unit plats of the following townships of the New Mexico and sixth principal meridians, to wit:

T. 48 N., R. 8 W., N. M. P. M.
T. 48 N., R. 9 W., N. M. P. M.
T. 48 N., R. 10 W., N. M. P. M.
T. 49 N., R. 8 W., N. M. P. M.
T. 49 N., R. 9 W., N. M. P. M.
T. 49 N., R. 10 W., N. M. P. M.
T. 50 N., R. 9 W., N. M. P. M.
T. 50 N., R. 10 W., N. M. P. M.
T. 50 N., R. 11 W., N. M. P. M.
T. 51 N., R. 9 W., N. M. P. M.
T. 51 N., R. 10 W., N. M. P. M.
T. 51 N., R. 11 W., N. M. P. M.
T. 15 S., R. 94 W., 6th P. M.
T. 15 S., R. 95 W., 6th P. M.
T. 15 S., R. 96 W., 6th P. M.

which plats were approved by the Secretary of the Interior on February 20, 1918, and are on file in the office of the project manager, United States Reclamation Service, Montrose, Colo., and at the local land office at Montrose, Colo.

2. **When and how to make entry for public land.**—Homestead entries for the farm units shown on said plats may be made beginning April 5, 1918, at 9 o'clock a. m., at the said local land office. Every person desiring to acquire any of said public lands must execute a homestead application subject to the provisions of the reclamation law in manner required by law, which, with the required fees and commissions, accompanied by certificate of the project manager as to the filing of application for rental of water and payment of water-rental charges as hereinafter provided, may be presented to said local land office, in person, by mail, or otherwise, within a period of 6 days prior to the opening, to wit: On and from March 30, 1918, to and including 9 o'clock a. m., April 5, 1918. Applications presented after said period of 6 days will be filed and noted in the order of their receipt. Any applications not based on a prior settlement right will be subject to valid settlement claims asserted in the manner required by law.

3. **Simultaneous filings for public lands.**—Applications reaching said local land office during said period of 6 days, will be held and treated as simultaneously filed, and the register and receiver will dispose of them as follows:

(*a*) Where there is no conflict the application will be allowed.

(*b*) Where there are conflicting homestead applications the register and receiver will write on cards the names of the several applicants and each of these cards will be placed in an envelope upon which there is no distinctive or identifying mark, and at 2 o'clock p. m., on the date of opening to entry, if practicable (if not, at the same hour one day later), after all the envelopes containing the names of the several applicants shall have been thoroughly mixed in the presence of such persons as may desire to be present, they will be drawn and numbered in order. The cards as drawn and numbered will be securely fastened to the applications of the respective persons, and the applications will be allowed in such order. Applications conflicting in whole with those previously allowed will be rejected in the usual manner.

4. **Failure of applicant to obtain public land applied for.**—Where any applicant fails to obtain land applied for by him he will be permitted to elect whether he will amend his application to embrace other lands not affected by pending applications and otherwise subject thereto when such amended application is presented, or withdraw his original application without prejudice. In the event of such withdrawal the fees and commissions will be returned by the receiver, and the water-rental charges deposited will be returned by the project manager, upon surrender of the certificate of filing issued by the project manager.

5. **Warning against unlawful settlement upon public land.**—No person will be permitted to gain or exercise any right whatever under any settlement or occupation of any of said public lands, begun at or prior to 9 a. m., April 5, 1918; provided, however, that this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

6. **Limit of area for which entry may be made.**—The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such lands, is fixed as shown upon the plats for the several farm units.

7. **Application for water rental.**—All water-rental applications must be made to the project manager, United States Reclamation Service, Montrose, Colo. Applications may be made on or after the date hereof upon forms provided for that purpose and must be accompanied by a payment of $3 per acre for each irrigable acre contained in the farm unit. Each water-rental application must be for a specified farm unit, and more than one person may make such application for the same farm unit. A certificate of filing will be issued each applicant by the project manager. Filing of water-rental application and issuance of certificate give no preference right to entry on public lands. Only when the project manager is notified by the local land office that an entry has been allowed will acceptance of the water-rental application be indorsed thereon. Whereupon all other water-rental applications affecting the farm unit in question with payments made, will be returned to the respective applicants, upon surrender by them of the certificate of filing issued by the project manager.

8. **Water-rental charge.**—The initial payment of $3 per acre will be credited as payment of a minimum charge of $1 per irrigable acre for the years 1918, 1919, and 1920, payment of which will entitle the entryman to one dollar's worth of water each of said years, at the rate fixed in the regulations of the Secretary of the Interior for similar lands on the project. Additional water will be furnished at the same rate as established for water deliveries to other lands in the project. The charges herein provided will be made against each acre of irrigable land in the farm unit whether water is used thereon or not, and no part of the initial payment of $3 per irrigable acre will be refunded at the termination of the three-year period. Future charges will be announced by further order or by public notice. Said minimum water-rental charge of $3 per irrigable acre will be required to be deposited in advance by the prospective entryman upon executing water-rental application before making application for entry in accordance with the terms of this order.

9. **Water users' association.**—The successful applicant after making homestead application will be required to subscribe the land embraced in his farm unit to the Uncompahgre Valley Water Users' Association.

10. **Water-right application under public notice.**—Within three months after date of public notice, hereafter to be issued for the lands described in said farm-unit plats, each entryman must make a formal water-right application covering his farm unit, in accordance with the terms of such notice and the last proviso of section 1 of said reclamation extension act. Upon failure so to do, the Secretary of the Interior may, at his option, cancel the entry in question with all rights acquired thereunder.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Uncompahgre project, June 30, 1918.

Cash		$2,029.61
Inventory of stock on hand		29,250.07
Accounts receivable		667.79
Construction work contracted		73,944.56
Construction cost	$7,167,189.18	
Less construction revenue earnings	612,724.43	
		6,554,464.75
Total		6,660,356.78
Accounts payable		69,108.61
Contingent obligations		75,974.17
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	$7,282,151.03	
Collection, transfer, refund, and joint construction vouchers issued	766,877.03	
Net investment		6,515,274.00
Total		6,660,356.78

Feature costs of Uncompahgre project, June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys	$74.06	$96,541.76
Storage works (Taylor Park Dam)		12,698.92
Canal systems:		
Diversion dam and headworks	230.06	115,834.70
Gunnison Tunnel	38,250.77	3,049,655.63
South Canal	9,318.68	870,645.47
	47,799.51	4,036,135.80
Lateral system:		
South	5,431.06	54,633.61
West	879.29	271,346.13
Montrose and Delta	3,811.48	557,228.33
Loutsenhizer	584.81	137,513.47
Selig	4,594.14	349,259.81
Ironstone	81,333.57	420,935.50
East	1,777.90	263,644.88
Garnet	154.95	5,381.93
	98,567.20	2,059,943.66
Drainage	337.02	3,831.74
Power system—Preliminary and general work		273.85
Farm units	439.67	35,857.27
Permanent improvements	175.91	59,822.31
Telephone system		6,788.48
Operation and maintenance during construction (water-rental basis)	220,396.64	839,043.39
Balance in unadjusted clearing accounts	5,549.15	5,549.15
Plant accounts	[1] 308.19	10,702.85
Gross construction cost to June 30, 1918	373,030.97	7,167,189.18
Less revenues earned during construction period:		
Rental of buildings	612.00	19,481.58
Rental of grazing and farming lands	5.00	7.00
Rentals of irrigation water	128,795.47	585,865.41
Contractors' freight refunds		2,671.66
Other revenues, unclassified	13.00	24.00
Profit on hospital operations	660.35	4,674.78
	130,085.82	612,724.43
Net cost of construction of project to June 30, 1918		6,554,464.75

Cost statement by calendar years, Uncompahgre project.

Year ending Dec. 31—	Construction.	Operation and maintenance during construction.	Total cost.
1904 [1]	$66,088.02	....	$66,088.02
1905	623,904.17	....	623,904.17
1906	1,199,879.82	....	1,199,879.82
1907	904,910.39	....	904,910.39
1908	541,230.15	$7,723.63	548,953.78
1909	594,384.50	21,331.50	615,716.00
1910	414,994.51	45,621.97	460,616.48
1911	274,704.21	47,156.30	321,860.51
1912	279,060.25	71,197.61	350,257.86
1913	267,755.55	104,523.62	372,279.17
1914	295,499.72	71,089.73	366,589.45
1915	301,819.68	89,569.33	391,389.01
1916	283,855.19	89,997.26	373,852.45
1917	160,204.77	165,083.88	325,288.65
January 1 to June 30, 1918	103,602.86	125,748.56	229,351.42
Plant accounts on June 30, 1918	10,702.85	....	10,702.85
Clearing accounts on June 30, 1918	5,549.15	....	5,549.15
Total	6,328,145.79	839,043.39	7,167,189.18

[1] Includes years 1902 to 1904, inclusive.

Cost statement by fiscal years, Uncompahgre project.

Year ending June 30—	Construction.	Operation and maintenance during construction.	Total cost.
1905 [1]	$131,304.58	....	$131,304.58
1906	1,130,248.77	....	1,130,248.77
1907	1,118,883.07	....	1,118,883.07
1908	610,901.02	$1,740.71	612,641.73
1909	664,653.48	17,504.38	682,157.86
1910	567,272.09	21,148.27	588,420.36
1911	253,221.37	59,804.71	313,026.08
1912	307,552.80	62,056.19	369,608.99
1913	197,088.86	83,920.94	286,009.80
1914	298,128.54	87,665.42	385,793.96
1915	383,917.56	72,820.40	456,737.96
1916	310,332.20	98,886.07	409,218.27
1917	190,996.08	113,099.66	304,095.74
1918	152,634.33	220,396.64	373,030.97
Plant accounts to June 30. 1917	11,011.04	....	11,011.04
Total	6,328,145.79	839,043.39	7,167,189.18

[1] Includes years 1902 to 1905, inclusive.

Estimated cost of contemplated work, Uncompahgre Valley project, during fiscal Year, 1919.

Features.	Estimated cost.	Features.	Estimated cost.
Storage system	$200	Operation and maintenance (rental basis)	125,000
Canal system	3,000	Reimbursable accounts	1,100
Lateral system	17,400	Plant and equipment	500
Drainage system	600		
Farm units	200	Total	148,000

IDAHO, BOISE PROJECT.

D. W. Cole, project manager, Boise, Idaho.

LOCATION.

Counties: Ada, Boise, Canyon, Elmore, and Malheur.

Townships: 1 S. to 5 N., Rs. 6 W. to 6 E., Boise meridian, and Tps. 21 and 22 S., R. 46 E., Willamette meridian.

Railroads: Oregon Short Line; Boise, Nampa & Owyhee, and Idaho Northern (now branches of Oregon Short Line); Boise Valley Traction; Caldwell Traction; and Intermountain.

Railroad stations and estimated population June 30, 1918: Boise, 25,000; Nampa, 4,800; Caldwell, 4,600; Meridian, 900; Kuna, 300; Wilder, 300; Bowmont, 60; and Melba, 40.

WATER SUPPLY.

Source of water supply: Boise River.

Area of drainage basin: 2,610 square miles.

Annual run-off in acre-feet of Boise River near Highland (2,610 square miles), 1895 to 1917: Maximum 3,829,800; minimum 1,119,530; mean, 2,576,600.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water season of 1918: 274,220 acres including 130,440 acres of vested water-right lands.

Area under water-right applications and rental contracts season of 1918: 130,000 acres.

Area under special contracts: 130,440 acres.

Length of irrigation season: From April 15 to October 10—178 days.

Average elevation of irrigable area: 2,500 feet above sea level.

Rainfall on irrigable area: At Boise station for 35 years, average 12.71 inches; 1917, 14.48 inches.

Range of temperature on irrigable area: $-28°$ to 107° F.

Character of soil of irrigable area: Clayey loam, light sandy loam, and sandy loam.

Principal products: Alfalfa, wheat, oats, clover, potatoes, apples, prunes, and small fruits.

Principal markets: Boise, Nampa, Caldwell, and Meridian, Idaho; Portland, Oreg.; and eastern cities.

LANDS OPENED FOR IRRIGATION.

Date of public notice: July 2, 1917; April 1, 1918.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.

Construction recommended by board of engineers February 15, 1905.

Construction authorized by Secretary March 27, 1905.

Main canals of New York Canal Co. and Idaho-Iowa Lateral and Reservoir Co acquired March 3, 1906.

First irrigation by Reclamation Service, season of 1906.

Boise River Dam completed September, 1908.

Upper Deer Flat embankment completed March, 1911.

Deer Flat Forest embankment completed June, 1911.

Lower Deer Flat embankment completed January, 1912.

Boise River power plant completed May, 1912.

Arrowrock Dam completed November, 1915.

Pioneer district drainage completed June, 1916.

Nampa and Meridian district drainage completed August, 1917.

Project 99 per cent completed June 30, 1918 (not including extensions).

IRRIGATION PLAN.

The irrigation plan of the Boise project provides for storage of water in the Arrowrock Reservoir on Boise River, about 22 miles above Boise, and in the Deer Flat Reservoir near Caldwell and Nampa, Idaho; the diversion of water from Boise River by the Boise River Dam, about 8 miles above Boise; the distribution of water on the south side of Boise River, through the Main Canal, leading from the dam to the Deer Flat Reservoir; distributing laterals heading in the Main Canal; distributing canals heading in the Deer Flat Reservoir; and distributing canal systems heading in the Boise River below the Boise River Dam; and the distribution of water on the north side of the Boise River to a small area of land east of Boise through a canal system heading at the Boise River Dam. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

SUMMARY OF GENERAL DATA FOR BOISE PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:			
Irrigable acreage when project is complete			327,720
Public land entered to end of fiscal year		67,452	
Public land withdrawn at end of fiscal year		3,160	
State land		3,350	
Private land		253,758	
Acreage service could have supplied season of 1917			274,220
Estimated acreage service can supply July 1, 1919			274,220
Acreage actually irrigated, season of 1917			[1] 95,524
Acreage cropped under irrigation, season of 1917			[1] 88,732
Crops:			
Value of irrigated crops, season of 1917			$4,386,545.00
Value of irrigated crops, per acre cropped			$49.44
Finances:			
Net construction cost to end of fiscal year			$11,688,829.51
Per cent complete at end of fiscal year (except extensions)			99
Appropriated for fiscal year 1919, total			$732,000.00
Allotment for construction, fiscal year 1919			$190,000.00
Estimated per cent complete, June 30, 1919[2] (except extensions)			100
Proposed appropriation, fiscal year 1920, for construction (extensions)			$368,000.00
Estimated gross construction cost to June 30, 1920			$13,161,000.00
Estimated per cent complete, June 30, 1920[2]			100
Announced construction charges per acre			$70 and $80
Appropriation, fiscal year 1918			[3] $417,740.00
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$339,628.19		
Transfers	19,443.27		
		$359,071.46	
Registered liabilities chargeable to 1918 appropriation		30,577.43	
Contract obligations wholly covered by 1918 appropriation		200.00	
			389,848.89
Unencumbered balance, July 1, 1918			27,891.11
Repayments:			
Value of construction water-right contracts			9,999,755.96
Construction charges—			
Accrued to end of fiscal year			222,487.35
Collected at end of fiscal year			200,208.40
Uncollected at end of fiscal year			22,278.95

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[1] Exclusive of lands having vested water rights.

[2] Not including extensions.

[3] Includes refunds authorized to be added to 1918 appropriation by sundry civil act of June 12, 1917.

Repayments—Continued.

Water-rental charges—		
Accrued to end of fiscal year		$655, 814. 77
Collected to end of fiscal year		633, 249. 16
Uncollected at end of fiscal year		22, 565. 61
Power earnings—		
Accrued to end of fiscal year		64, 025. 11
Collected to end of fiscal year		64, 025. 11

Drainage:

Estimated acreage damaged by seepage to end of fiscal year		25, 750
Miles of drains built to end of fiscal year—		
Open	131. 9	
Closed	. 8	
Total		132. 7
Estimated acreage protected by drains built to end of fiscal year		83, 500
Estimated acreage to be protected by authorized system		93, 500
Cost of drainage works to end of fiscal year		$687, 590. 77

CONSTRUCTION DURING FISCAL YEAR.

Except for a small amount of work in completing drainage systems construction during the fiscal year was confined to improvements on the Main Canal and structures and improvements on the lateral system. Improvements on the upper end of the Main Canal cost approximately $28,338 and consisted largely of placing 15,833 square yards of reinforced concrete lining. On the lateral system 540 timber structures were placed, consisting of taps, weirs, checks, culverts, and bridges. Seventy-six small concrete and masonry structures were installed, aggregating 372 cubic yards. Lining placed in laterals amounted to 239 cubic yards of concrete. Lateral excavation amounted to 8,745 linear feet, or 5,023 cubic yards.

BOISE POWER PLANT.

As the hydroelectric plant at Boise Diversion Dam had served its principal purpose for the construction of Arrowrock Dam, it was leased to the Idaho Power Co. for a period of five years, beginning July 1, 1916, for an annual rental of $11,000. All costs of operation and maintenance are borne by the lessee, and reservation of electric power is held at cost of production for use in drainage and other work on the project.

SEEPAGE AND DRAINAGE.

The approximate area of seeped land is given in the accompanying table, based on a water plane from zero to 6 feet below the ground surface. These areas are not wholly unproductive, but the tendency is for conditions to gradually grow worse. During May and June, 1918, one small area in the Nampa and Meridian irrigation district grew worse so rapidly that growing crops were destroyed.

Name of area.	Acreage reclaimed.	Estimated acreage still seeped.
Pioneer irrigation district	10,500	
Nampa and Meridian irrigation district	6,200	200
Fargo Basin	700	550
Arena Basin		350
Ten Mile		500
Greenleaf		300
Frohman		100
Riverside and Big Bend irrigation district		7,000
Miscellaneous		250
Total	17,400	9,250

A contract for the construction of a drainage system was made with the Riverside irrigation district during the year and an organization was perfected during June, 1918, for beginning this work. Construction of the drainage system of the Nampa and Meridian irrigation district was completed early in the fiscal year and consisted of placing 27 timber structures, 1 concrete structure, and 1 steel structure. The material used amounted to 47,610 feet of timber, 189 cubic yards of concrete, and 14,000 pounds of structural steel.

BOARD MEETINGS.

Date.	Topic.	Personnel.
1917. July 23	Investigating	Gen. W. L. Marshall, I. D. O'Donnell, and C. R. Trowbridge.
July 26	Bookkeeping	C. A. Lyman and Boise project clerks.
Oct. 1	Main South Side Canal	D. C. Henry, A. J. Wiley, D. W. Cole, and C. C. Fisher.
Nov. 2	Costkeeping and accounting	James Munn, C. C. Fisher, and Boise project clerks.
1918. Apr. 13	.....do	Do.

OPERATION AND MAINTENANCE.

During 1917 water was delivered on a rental basis at the rate of 40 cents per acre-foot prior to August 1 and 60 cents per acre-foot on and after that date, or for flood and stored water, respectively. The revenues from this source amounted to approximately $175,050 and resulted in a delivery of 358,483 acre-feet of water to 2,380 farms, containing an irrigable area of 117,950 acres. The average amount of water used was 3.07 acre-feet, at an average cost of $2.10 per acre for operation and maintenance. The opening of the project by public notice on July 2, 1917, did not change the status of rental contracts for the season.

Under contract with the New York Canal Co. (Ltd.) 21,498 acres of land, comprising 405 farms, were watered through the Reclamation Service canal system with water derived from the vested right of that company, supplemented with storage water from Arrowrock Reservoir under a temporary contract.

The reservoirs of the Idaho-Iowa Lateral & Reservoir Co. were partly filled, under contract, through the Government canal system.

Under permanent contracts water was released from Arrowrock Reservoir to supplement the vested rights of the following irrigation districts: Nampa and Meridian, Pioneer, Farmer's Cooperative Ditch Co., Settler's Canal Co., and Farmer's Union Ditch Co.

The rights of the United States to divert water from the natural flow of the Boise River terminated for the season of 1917 on July 11, after which it was necessary to draw from Arrowrock Reservoir to maintain the necessary discharge in the main canal.

The full storage capacity of Arrowrock Reservoir was available for the season; the maximum storage was reached on July 10, 1917. On October 7 the water had all been drawn out except 250 acre-feet. The maximum storage for Deer Flat Reservoir was 103,789 acre-feet, which was reached on May 17, 1917. On October 6 there remained 14,976 acre-feet in this reservoir.

The total diversion for the project during 1917 was 618,272 acre-feet, or 5.30 acre-feet per acre, which included canal and reservoir losses. The total waste from the project was 2.7 per cent of the total diverted at the head of the main canal. The loss from the Deer Flat Reservoir was 12.6 per cent, as compared with 15.2 per cent for 1916.

Maintenance.—The fall of 1917 was very favorable for maintenance work, and the canal and lateral systems of the project were put in good condition. The winter of 1917 and 1918 was mild, resulting in little damage to canals and structures. The spring of 1918 opened early and permitted additional work on structures and laterals, resulting in a nearly continuous run of water with very few breaks.

Historical review, Boise project, Idaho.

Item.	1913	1914	1915	1916	1917	1918
Acreage to which the service was prepared to furnish water	207,000	207,000	207,000	[1] 223,866	[1] 223,866	[1] 274,220
Acreage irrigated[2]	76,265	83,590	97,127	[2] 101,315	[2] 95,524	[2] 117,024
Miles of canals operated	969	971	973	980	982	988
Water diverted (acre-feet)	495,470	495,665	542,102	656,854	618,272	(3)
Water delivered to land per acre of land irrigated (acre-feet)	2.38	2.62	2.81	3.56	3.07	(3)

[1] Including partial service to vested water-right lands.
[2] Acreage served with full water supply.
[3] Not yet determined.

SETTLEMENT.

The high prices realized for farm products and live stock, together with the national policy of encouraging more extensive farming and cultivation to meet war conditions, continued to give impetus to clearing and cultivation of idle lands. The rapid appropriation of State land is shown by the fact that in Ada County only 24 acres of irrigable land remain unsold, divided among 6 tracts. The farming under lease of vacant lands bordering the Deer Flat Reservoir was continued. As a result of favorable prices and, in general, very satisfactory yields, the demand for land continued to increase and improved land continued to advance in price.

Settlement data, Boise project.

Item.	1914	1915	1916	1917	1918
Total number of farms on project	2,600	2,690	3,926	3,932	3,992
Population	8,000	8,600	12,560	12,580	13,200
Number of irrigated farms	1,771	1,908	2,450	2,780	3,060
Operated by owners or managers	1,521	1,358	1,590	1,900	2,090
Operated by tenants	250	550	860	880	970
Population	5,313	6,143	7,520	8,340	9,170
Number of towns	10	10	10	10	10
Population	30,400	30,500	34,350	34,750	36,000
Total population in towns and on farms	38,400	39,100	46,910	47,330	49,200
Number of public schools	20	22	22	22	24
Number of churches	50	52	52	52	52
Number of banks	11	13	15	15	15
Total of capital stock	$1,505,000	$1,545,900	$1,750,000	$1,800,000	$1,800,000
Amount of deposits	$7,326,480	$8,424,300	$9,000,000	$11,500,000	$11,500,000
Number of depositors	27,038	[1] 23,772	24,850	[1] 25,000	[1] 25,000
Total number of relinquishments	10	6	18	32	....

[1] Estimated; some banks refuse to give number of depositors.

PRINCIPAL CROPS.

The principal crops grown on the project during 1917, in the order of value, were as follows: Alfalfa, wheat, potatoes, clover hay, and clover seed. Alfalfa covered the largest area, amounting to 34,087 acres, an increase over the previous year of 7,697 acres. Each of the above named crops except clover seed showed an increase in acreage. The fruit crop of the project was large. Market conditions were good except for slight losses caused by delay in shipping facilities. The surplus of the potato crop was used largely in the manufacture of potato flour at a plant established at Meridian. The average crop return was increased from $32.07 in 1916 to $49.44 in 1917. All these figures are restricted to the areas covered by the usual crop census of the Reclamation Service and do not include lands in the New York Canal tract nor in the Nampa-Meridian and Pioneer irrigation districts, to which the Government furnished water to supplement partial vested rights.

Crop report, Boise project, Idaho, year of 1917.[1]

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	34,087	Ton	132,805	3.90	$15.00	$1,992,075	$58.50
Alfalfa seed	375	Bushel	843	2.25	10.00	8,430	22.50
Alsike seed	428	...do	3,240	7.57	12.00	38,880	90.84
Apples	3,126	Ton	3,289	1.05	30.00	98,670	31.50
Barley	3,217	Bushel	65,618	20.4	1.20	78,742	24.48
Beans	475	...do	4,800	10.1	6.00	28,800	60.60
Beets, sugar	25	Ton	375	15	6.00	2,250	90.00
Clover, hay	7,678	...do	15,570	2.03	15.00	233,550	30.45
Clover, seed	4,496	Bushel	17,138	3.81	13.00	222,794	49.50
Corn, ensilage	43	Ton	430	10	5.00	2,150	50.00
Corn, Indian	1,414	Bushel	53,600	37.90	1.50	80,416	56.86
Sorghum, seed	21	...do	108	5.14	2.00	216	10.28
Corn, fodder	440	Ton	2,887	6.56	5.00	14,435	32.80
Corn, pop	40	Bushel	1,640	41	4.00	6,560	164.00
Fruits, small	53	Pound	53,000	1,000	.05	2,650	50.00
Garden	691					50,263	73.00
Hay (except as above)	513	Ton	725	1.41	12.00	8,700	16.92
Millet seed	9	Bushel	200	22.20	1.50	300	33.30
Oats	3,205	...do	81,790	25.52	1.00	81,790	25.50
Onions	16	...do	1,770	111	1.20	2,124	133.20
Pasture	6,555				9.50	62,250	9.60
Peaches	177	Pound	770,000	4,350	.01	7,700	43.50
Pears	5	...do	5,000	1,000	.03	150	30.00
Prunes	266	...do	307,650	1,157	.01¾	5,384	20.25
Potatoes, white	2,165	Bushel	350,450	162	.75	262,840	121.50
Potatoes, sweet	7	...do	540	77	2.00	1,180	154.00
Rye	132	...do	1,540	11.7	1.40	2,156	16.38
Sorghum (sirup)	25	Gallon	2,500	100	.50	1,250	50.00
Sudan grass (seed)	2	...do	1,200	600	.20	240	120.00
Wheat	25,676	Bushel	544,800	21.22	2.00	1,089,600	42.44
Less duplicated areas	6,630						
Total cropped	88,732	Total and average				4,386,545	49.44

		Areas.	Acres.	Number farms.	Per cent of project.[1]
Irrigated, no crop:		Total irrigable area farms reported	117,950	2,380	82.5
Nonbearing orchard	1,313	Total irrigated area farms reported	95,524	2,380	66.8
Young alfalfa	8,638	Under rental contracts	95,524	2,380	66.8
Young clover	2,300	Total cropped area farms reported	88,732	2,380	62
Miscellaneous	787				
Ground fall plowed	914				
Less duplicated areas	7,160				
Total irrigated	95,524				

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[1] Percentages in cultivation based on area shown on approved plats, 164,423 acres, less 21,498 acres under New York water rights and for which crop statistics were not obtained. The net irrigable area of project lands for this computation is therefore taken to be 142,925 acres.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE JULY 2, 1917.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof and supplementary thereto, and particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), public notice for the Boise project, Idaho-Oregon, is hereby issued as follows:

2. **Lands for which water will be furnished.**—Water will be furnished under said project in the irrigation season of 1917, and thereafter, for the irrigable lands of said project, shown on the farm-unit plats of the following townships of the Boise meridian, to wit:

T. 1 S., R. 1 W.
T. 1 S., R. 2 W.
T. 1 N., R. 1 E.
T. 1 N., R. 1 W.
T. 1 N., R. 2 W.
T. 1 N., R. 3 W.
T. 2 N., R. 1 E.
T. 2 N., R. 2 E.
T. 2 N., R. 3 E.
T. 2 N., R. 1 W.
T. 2 N., R. 2 W.
T. 2 N., R. 3 W.
T. 2 N., R. 4 W.
T. 3 N., R. 1 E.
T. 3 N., R. 2 E.
T. 3 N., R. 3 E.
T. 3 N., R. 1 W.
T. 3 N., R. 2 W.
T. 3 N., R. 3 W.
T. 3 N., R. 4 W.
T. 3 N., R. 5 W.
T. 4 N., R. 3 W.
T. 4 N., R. 4 W.
T. 4 N., R. 5 W.
T. 5 N., R. 5 W.

which plats were approved by the Secretary of the Interior on January 26, 1917, and are on file at the local land offices at Boise, Idaho, and Vale, Oreg., and at the office of the project manager, United States Reclamation Service, Boise, Idaho.

3. **Limit of area for which water right may be secured.**—The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such lands, is fixed at the amounts shown upon the plats for the several farm units. The maximum limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each land owner.

4. **Application for water right.**—All water-right applications must be made to the project manager, United States Reclamation Service, Boise, Idaho, upon forms provided for that purpose, and may be made on and after the date of this notice.

5. **Classes of charges for water right.**—The water-right charges are of two kinds, to wit: (*a*) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge; and (*b*) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

6. **General construction charge.**—The construction charge, except as hereinafter provided, shall be $80 per acre of irrigable land shown on said plats, payable as follows:

(*a*) For lands shown on said plats and entered on or before August 13, 1914, or lands in private ownership which were subscribed to the Payette-Boise Water Users' Association on or before August 13, 1914, the said construction charge shall be paid in 10 equal annual installments, the first of which shall be paid at the time of filing water-right application, the second of which shall be due and payable on December 1 of the following year, and subsequent installments shall be due and payable December 1 of each year thereafter: *Provided*, That if acceptance of the terms of said reclamation extension act, or a water-right application thereunder, be filed by the applicant within six months of the date of this notice, said construction charge shall be divided into 20 annual installments, the first of which shall become due and payable on December 1, 1917, and subsequent installments on December 1 of each year thereafter. The first four of such installments shall be each 2 per cent, the next two installments shall be each 4 per cent, and the next 14 installments shall be each 6 per cent of said construction charge.

(*b*) For homestead entries made after August 13, 1914, and land in private ownership signed after August 13, 1914, under contract with the Payette-Boise Water Users' Association, the construction charge will be payable in the following installments: An initial payment of 5 per cent at the time of entry or filing of water-right application, the remainder in 15 annual installments, the first five of which shall each be 5 per cent, and the remaining 10 each 7 per cent of the total construction charge. The first of said annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due on each December 1 thereafter until paid.

7. **Increased construction charge in certain cases.**—In all cases where water-right application for lands in private ownership or for lands under entries not subject to the reclamation act, shall not be made within one year after the date of this notice, the construction charge for such lands shall be increased 5 per cent each year until such application is made and the initial installment is paid.

8. **Advance payment of construction charge permissible.**—Any water-right applicant may, if he so elects, pay the whole or any part of the construction charge owing by him, within any shorter period than that provided by the public notice and orders applicable to his land.

9. **Reduced construction charge if all lands are pledged.**—If, within one year from the date of this notice, all of the irrigable lands of the Boise project shown on said farm-unit plats are duly pledged in accordance with law and the regulations of the Secretary of the Interior to return the payment of the construction and operation and maintenance charges, either through individual contracts, water users' association contracts, or through irrigation districts duly organized and confirmed by judicial decree, then the said construction charge of $80 per irrigable acre will be reduced to $70 per irrigable acre.

10. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice shall be 75 cents per acre of irrigable land shown on said farm-unit plats whether water is used thereon or not, which will entitle the water user to 1 acre-foot of water per irrigable acre. Additional water will be furnished for 20 cents per acre-foot during the flood season ending June 30, and 40 cents per acre-foot during the storage season beginning July 1: *Provided*, That the owners of New York water-right lands accepting the terms of this notice, by filing water-right application hereunder shall pay 40 cents per

irrigable acre whether water is used thereon or not, which will entitle the user to 1 acre-foot of water per irrigable acre after July 1, 1918, and additional water will be delivered at the rate of 40 cents per acre-foot. All such charges will be due and payable annually on March 1 following the irrigation season, but where water-right application is made for public land entered under the reclamation law after June 15 in any year no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

11. **Lands under New York Canal.**—Supplemental water rights from the irrigation works of the Boise project will be furnished to New York water-right lands shown on the said farm-unit plats upon the execution of water-right application contract and lien by the landowner on the form of application approved for that purpose upon the following price, terms, and conditions:

(*a*) That upon satisfactory proof of ownership of water rights from the New York Canal Co., the water claimable thereunder being subject to delivery by the United States under the terms of the contract of March 3, 1906, between the United States and the New York Canal Co., and upon satisfactory and appropriate action making such New York water rights inseparably appurtenant to the land, supplemental water rights will be furnished for all such New York water right lands to which such New York water rights to the amount of at least one-half of a miner's inch per acre, or one share of New York Canal Co. stock to each 1⅝ acres of land, shall have been made appurtenant, at a price of $33 per acre of irrigable land as shown on said farm unit plats, upon the terms of payment provided in section one of said reclamation extension act, subject, however, to the provisions of section 9 of said act. Such supplemental water supply from the works of the United States will be delivered during that period of each irrigation season after July 1, and is to be sufficient in amount to make the total water supply delivered for such lands after July 1 from all sources equal in amount to the average water supply furnished after July 1, to similar lands of the Boise project for which full water rights are furnished from said project. The operation and maintenance charge for delivery of water claimable on account of said vested rights of the New York Canal Co. shall be at the rates provided in the said contract between the United States and the New York Canal Co. and the operation and maintenance charge for the delivery of such supplemental supply from the reservoirs and other works of the United States shall be at the rates determined under section 5 of the reclamation extension act and announced by public notices for the Boise project.

(*b*) Lands having New York water rights appurtenant thereto, but in less amount than one-half of a miner's inch per acre or one share for each 1⅝ acres, will be considered as New York lands subject to the $33 rate to the extent of the number of acres that such New York right appurtenant thereto will provide one-half of a miner's inch per acre, and will be considered as project lands subject to the $80 rate as to the remainder thereof.

(*c*) If, within one year from the date of this notice all of the irrigable lands of that portion of the Boise project in which the said New York lands are located (being that portion of the project lying northeast of Indian Creek between the Nampa & Meridian irrigation district and the New York Canal) are duly pledged in accordance with law and the regulations of the Secretary of the Interior to return the payment of the construction and operation and maintenance charges, either through individual contracts, water users' association contracts or through irrigation districts duly organized and confirmed by judicial decree, then the said construction charge of $33 per irrigable acre for a supplemental water right will be reduced to $25 per irrigable acre, and said construction charge of $80 per irrigable acre for a full water right will be reduced to $70 per irrigable acre as provided in Section 9 hereof.

(*d*) Whenever the major portion of the lands receiving water from any of the old New York laterals constructed or owned by the said New York Canal stockholders and supplying two or more users, shall have been duly subscribed for supplemental water rights under the terms of this notice, then the operation and maintenance of such lateral will be taken over by the United States upon the execution of a proper conveyance by the owners thereof turning such lateral over to the United States, and the said supplemental water supply delivered at the land, or as near thereto as provided by the approved regulations applicable to project lands taking water from Government laterals. That until such laterals are taken over by the United States, the supplemental water supply provided for herein will be measured and delivered at the same points provided in the said contract between the New York Canal Co. and the United States for the delivery of the vested water rights of the New York Canal stockholders.

12. **Place and manner of payment of water charges.**—All water charges must be paid at the office of the United States Reclamation Service, Boise, Idaho, and will be accepted in the form of New York draft or money order payable to special fiscal agent, United States Reclamation Service, Boise, Idaho, or in currency.

13. **Cost of Arrowrock Reservoir and of its operation and maintenance for 1917.**—It is hereby announced that the cost of Arrowrock Reservoir is $4,750,000, not including the power plant at the Boise River diversion dam; and the estimated cost of the operation and maintenance of said reservoir and the protection and division of stored water therefrom for the season of 1917, is $13,000.

14. **Expenditure for drainage and distributing works.**—The construction charge as announced herein includes the sum of approximately $302,000 expended and to be expended after January 1, 1917, for drainage and distributing works. The expense of any further work of this kind which may in the future be necessary, must be met by the land owners, through an increase in the construction charge herein announced, or otherwise.

15. **Termination of temporary water contracts.**—All water rental contracts and contracts for temporary water service now in effect on the Boise project for lands described in Section 2 hereof will terminate at the end of the irrigation season of 1917, but during said season of 1917, water will be furnished only under such rental contracts.

FRANKLIN K. LANE,
Secretary of the Interior.

PUBLIC NOTICE, APRIL 1, 1918.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13 1914 (38 Stat., 686), public notice for the Boise project, Idaho-Oregon, is hereby issued as follows:

2. **Lands for which water will be furnished.**—Upon proper water-right application being made therefor, water will be furnished under said project in the irrigation season of 1918 and thereafter, for the irrigable lands of said project, now first shown on the farm-unit plats of the following townships of the Boise Meridian, to-wit: T. 3 N., R. 1 E., T. 3 N., R. 1 W., T. 3 N., R. 2 W., approved by the Secretary of the Interior on January 26, 1917, and amended by the Acting Director of the Reclamation Service on the date of this notice; T. 4 N., R. 1 W., approved by the Secretary of the Interior on the date of this notice. All of said plats with amendments are on file at the local land office at Boise, Idaho, and at the office of the project manager, United States Reclamation Service, Boise, Idaho.

3. **Public notice of July 2, 1917, applicable.**—All of the terms and conditions of the public notice for the Boise project, dated July 2, 1917, so far as the same may be applicable, shall apply to the lands covered by this public notice and shown on the farm-unit plats above described.

4. **Limitation as to reduced construction charge.**—The time within which a reduced construction charge may be secured under paragraph 9 and subdivision (*c*) of paragraph 11 of said public notice, dated July 2, 1917, is not extended as to any land beyond July 2, 1918.

E. C. Bradley,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Boise project, June 30, 1918.

Cash		$8,144.51
Inventory of stock on hand		120,194.09
Accounts receivable		9,798,260.46
Construction work contracted		200.00
Construction cost	$12,470,748.32	
Less cost adjustments	781,918.81	
		11,688,829.51
Operation and maintenance cost	128,094.45	
Less cost adjustments	17,915.84	
		110,178.61
Total		21,725,807.18
Accounts payable		34,836.20
Contingent obligations		8,344.51
Reserves for repayment to reclamation fund of cost of project		10,006,289.36
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	$13,310,721.87	
Collection, transfer, refund, and joint construction vouchers issued	1,634,384.76	
Net investment		11,676,337.11
Total		21,725,807.18

Feature costs of Boise project to June 30, 1918.

Feature.	Cost.	
	Fiscal year 1918.	To June 30, 1918.
Examination and surveys:		
Distribution unit	[1] $572.02	$124,158.94
Storage unit		8,720.61
	[1] 572.02	132,879.55
Storage system:		
Deer Flat Reservoir		957,614.30
Arrowrock Reservoir	[1] 142,198.41	4,499,609.07
	[1] 142,198.41	5,457,223.37
Canal system: Main south side canal	4,300.60	2,035,830.01
Lateral system:		
From main canal	7,051.82	1,421,618.27
From Deer Flat Reservoir	[1] 4,944.18	1,173,613.59
Penitentiary lateral		24,355.93
	2,107.64	2,619,587.79
Drainage system:		
Pioneer district	768.89	266,725.41
Nampa-Meridian district	14,126.90	277,746.64
Cooperative district	[1] 4,064.29	63,344.44
Fargo Basin		37,771.48
From Deer Flat		31,796.98
Riverside	[1] 597.58	2,584.85
Miscellaneous	302.67	7,620.97
	10,536.59	687,590.77
Power system		195,305.27
Farm units	53.70	46,953.50
Permanent improvements:		
Distribution unit	350.70	53,588.23
Storage unit		80,776.94
	350.70	134,365.17
Telephone system:		
Distribution unit		34,377.50
Storage unit		9,675.20
		44,052.70
Operation and maintenance during construction	158,261.15	1,079,208.13
Balance in plant accounts	[1] 21,040.89	37,752.06
Gross construction cost to June 30, 1918	11,799.06	12,470,748.32
Less revenues earned during construction period:		
Rental of buildings	509.99	27,267.31
Rental of grazing and farming lands	318.21	14,830.50
Net power earnings (prior to public notice)	[1] 4,611.10	59,515.11
Rentals of irrigation water	143,235.31	654,158.55
Contractor's freight refunds		13,082.53
Other revenues, unclassified	[1] 3,369.23	17,110.37
Loss on hospital operations	1,341.05	[1] 4,067.23
Other profits on operations, unclassified	21.67	21.67
	137,445.90	781,918.81
Net cost of construction of project to June 30, 1918		11,688,829.51

[1] Deduct.

Cost statement by calendar years, Boise project.

Year ending Dec. 31—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1902	$2,274.51				$2,274.51
1903	2,965.58				2,965.58
1904	20,809.47				20,809.47
1905	19,354.12				19,354.12
1906	602,924.72				602,924.72
1907	737,141.73	$9,455.80		$9,455.80	746,597.53
1908	823,987.25	4,973.78		4,973.78	828,961.03
1909	836,509.76	41,388.89		41,388.89	877,898.65
1910	787,274.36	64,406.52		64,406.52	851,680.88
1911	2,025,053.46	51,841.70		51,841.70	2,076,895.16
1912	1,487,290.75	84,226.36		84,226.36	1,571,517.11
1913	1,065,474.05	137,330.56		137,330.56	1,202,804.61
1914	1,869,592.00	124,397.87		124,397.87	1,993,989.87
1915	794,651.40	140,131.10		140,131.10	934,782.50
1916	406,679.31	173,033.34		173,033.34	579,712.65
1917	[1] 157,512.76	248,022.21		248,022.21	90,509.45
January to June 30, 1918	29,318.42		$128,094.45	128,094.45	157,412.87
Plant accounts to June 30, 1918	37,752.06				37,752.06
Total	11,391,540.19	1,079,208.13	128,094.45	1,207,302.58	12,598,842.77

[1] Deduct.

Statement of cost by fiscal years, Boise project.

Year ending Dec. 31—	Construction.	Operation and maintenance.			Totalcost.
		During construction.	Under public notice.	Total.	
1906	[1] $177,614.16				$177,614.16
1907	825,797.94	$4,606.26		$4,606.26	830,404.20
1908	861,209.53	9,529.25		9,529.25	870,738.78
1909	775,939.73	29,898.01		29,898.01	805,837.74
1910	673,232.59	46,499.71		46,499.71	719,732.30
1911	1,226,236.26	49,059.84		49,059.84	1,275,296.10
1912	2,109,108.94	65,027.15		65,027.15	2,174,136.09
1913	1,161,361.85	117,709.90		117,709.90	1,279,071.75
1914	1,560,385.86	144,422.58		144,422.58	1,704,808.44
1915	1,521,283.87	147,643.91		147,643.91	1,668,927.78
1916	368,090.94	133,520.11		133,520.11	501,611.05
1917	218,947.66	173,030.26		173,030.26	391,977.92
1918	[2] 146,462.09	158,261.15	$128,094.45	286,355.60	139,893.51
Plant accounts on June 30, 1917	58,792.95				58,792.95
Total	11,391,540.19	1,079,208.13	128,094.45	1,207,302.58	12,598,842.77

[1] Covers period 1902 to 1906.

[2] Deduct.

Estimated cost of contemplated work, Boise project, during fiscal year 1919.

Features.	Estimated cost during fiscal year 1919.	
	Subfeature,	Principal feature.
Examination and surveys—Walter's Butte irrigation district		$1,000.00
Canal system:		
Concrete lining, main canal	$30,000.00	
Notus Canal, north side unit	50,000.00	
		80,000.00
Lateral system:		
Canals or laterals	15,000.00	
Minor structures	15,000.00	
Laterals, north side unit	42,600.00	
		72,600.00
Drainage system:		
Arena district	30,000.00	
Riverside and Big Bend Irrigation district	120,000.00	
		150,000.00
Farm units—North side unit		1,000.00
Permanent improvements—Kuna bunkhouse		1,000.00
Operation and maintenance during construction (water-rental basis)		15,000.00
Operation and maintenance under public notice		225,000.00
Reimbursable accounts		1,500.00
Total		547,100.00

Operating expenses and revenues, Boise project, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works:						
Arrowrock Reservoir	$9,092.82	$395.59	$9,488.41	$9,092.82	$395.59	$9,488.41
Deer Flat Reservoir	3,587.68	....	3,587.68	3,587.68	....	3,587.68
	12,680.50	395.59	13,076.09	12,680.50	395.59	13,076.09
Canal system:						
Headworks	384.47	2,087.19	2,471.66	384.47	2,087.19	2,471.66
Main canal (first section)	6,778.15	7,327.56	14,105.71	6,778.15	7,327.56	14,105.71
Main canal (second section)	1,655.80	251.88	1,907.68	1,655.80	251.88	1,907.68
	8,818.42	9,666.63	18,485.05	8,818.42	9,666.63	18,485.05
Lateral system:						
From main canal (first section)	4,556.13	13,844.92	18,401.05	4,556.13	13,844.92	18,401.05
From main canal (second section)	24,174.90	28,963.16	53,138.06	24,174.90	28,963.16	53,138.06
From upper Deer Flat embankment	1,288.08	567.09	1,855.17	1,288.08	567.09	1,855.17
From lower Deer Flat embankment	11,141.16	10,143.00	21,284.16	11,141.16	10,143.00	21,284.16
Penitentiary lateral	379.90	648.83	1,028.73	379.90	648.83	1,028.73
	41,540.17	54,167.00	95,707.17	41,540.17	54,167.00	95,707.17
Drainage system	....	1,431.02	1,431.02	....	1,431.02	1,431.02
Undistributed expenses:						
Buildings	....	658.04	658.04	....	658.04	658.04
Roads	....	138.12	138.12	....	138.12	138.12
Camp maintenance	....	[1]493.21	[1]493.21	....	[1]493.21	[1]493.21
Telephone expense	[1]131.86	[1]137.25	[1]269.11	[1]131.86	[1]137.25	[1]269.11
General expense	[1]536.46	[1]558.36	[1]1,094.82	[1]536.46	[1]558.36	[1]1,094.82
Hydrometry	172.18	....	172.18	172.18	....	172.18
Engineering and inspection	[1]150.53	[1]156.68	[1]307.21	[1]150.53	[1]156.68	[1]307.21
Superintendence and accounts	[1]84.50	[1]87.94	[1]172.44	[1]84.50	[1]87.94	[1]172.44
Miscellaneous	374.15	389.42	763.57	374.15	389.42	763.57
	[1]357.02	[1]247.86	[1]604.88	[1]357.02	[1]247.86	[1]604.88
Total	62,682.07	65,412.38	128,094.45	62,682.07	65,412.38	128,094.45

REVENUES.

	Fiscal year, 1918.	To end fiscal year 1918.
Rental of land and buildings during operating period	$572.50	$572.50
Rentals of irrigation water	1,656.22	1,656.22
Other revenues, unclassified, earned during operation period	15,687.12	15,687.12
Total	17,915.84 110,178.61	17,915.84 110,178.61

[1] Deduct.

IDAHO, KING HILL PROJECT.

Walter Ward, project manager, King Hill, Idaho.

LOCATION.

Counties: Elmore, Gooding, Owyhee, and Twin Falls.
Townships: 5 and 6 S., Rs. 8 to 13 E., Boise meridian.
Railroads: Oregon Short Line.
Railroad stations and estimated population, June 30, 1918: Glenn's Ferry, 1,200; King Hill, 150; Hannett, 50.

WATER SUPPLY.

Source of water supply: Malad River, fed by numerous large springs.
Area of drainage basin: Underground source, area indeterminate.
Annual run-off in acre-feet: Approximately 1,000,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water for season 1918: Canals and laterals are constructed so that a partial supply can be delivered to about 14,500 acres.
Length of irrigation season: April 1 to October 10—193 days.
Average elevation of irrigable area: 2,750 feet above sea level.
Rainfall on irrigable area: Six-year average, 9.8 inches.
Range of temperature on irrigable area: −17° to 111° F.
Character of soil on irrigable area: Ranges from light to heavy sandy loam; heavy clay.
Principal products: Alfalfa, early vegetables, grains, fruit, and stock.
Principal markets: Portland, Boise, and small towns in southern Idaho.

CHRONOLOGICAL SUMMARY.

First irrigation by King Hill Irrigation Co., season of 1909.
Reconnoissance made and preliminary surveys begun by the United States in 1916.
Construction recommended by board of engineers August 17, 1916.
Construction authorized by Secretary July 2, 1917.
Reconstruction work begun by Reclamation Service in February, 1918.

IRRIGATION PLAN.

The irrigation plan of the King Hill project provides for the diversion of water from the Malad River about 1 mile above its confluence with the Snake River, the conveyance of the water through a flume for about 4,000 feet, and the delivery of 300 second-feet to the canal system of the project by the Idaho Power Co.

The project main canal is approximately 52 miles long and crosses the Snake River at two points, by means of siphons on steel bridges. About half the irrigable acreage lies on each side of the Snake River. The acreage supplied by gravity is about 15,800 with 576 acres supplied by turbine connected pumps.

The present plans for the reconstruction of the project call for the building of several concrete flumes, concrete and wood-stave pipe siphons, wood-stave flumes, gunite lining, and one gunite flume. The only completed feature so far is the gunite flume. About 1,300 feet of concrete flume have been built prior to June 30, 1918.

SUMMARY OF GENERAL DATA FOR KING HILL PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:		
Irrigable acreage when project is complete		16,376
Public land entered to end of fiscal year	9,026	
Public land open to entry at end of fiscal year	371	
State land	1,071	
Private land	5,908	
Acreage service could have supplied season of 1917		[1] 14,500
Estimated acreage service can supply July 1, 1919		[1] 14,500
Acreage actually irrigated, season of 1917		[2] 1,585
Acreage cropped under irrigation, season of 1917		[2] 1,093

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[1] Only a partial delivery, capacity insufficient.
[2] Based on reports for 2,242 acres.

Crops:

Value of irrigated crops, season of 1917	$51,876.00
Value of irrigated crops, per acre cropped	47.46

Finances:

Net construction cost to end of fiscal year			$169,999.88
Per cent complete June 30, 1918			17
Appropriated for fiscal year 1919, total			423,000.00
Allotment for construction, fiscal year 1919			357,500.00
Estimated per cent complete, June 30, 1919			53
Proposed appropriation, fiscal year 1920, for construction			312,000
Estimated per cent complete, June 30, 1920			84
Appropriation, fiscal year 1918			[1]235,300.00
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$202,483.83		
Transfers	16,381.40		
		$218,865.23	
Registered liabilities chargeable to 1918 appropriation		16,248.66	
			235,113.89
Unincumbered balance, July 1, 1918			186.11

Drainage:

Miles of drains built to end of fiscal year, open	0.30
Estimated acreage protected by drains built to end of fiscal year	600

CONSTRUCTION DURING FISCAL YEAR.

Canal system.—Reconstruction of the King Hill project was begun in February, 1918, and the work shut down in May to permit the operation of the system by the irrigation district.

During the above working period 1,279 linear feet of concrete flume, 1,625 linear feet of gunite flume, 172 linear feet of wood-stave flume, and 1 concrete wasteway were built. About 6 miles of construction road were also built.

SURVEYS AND INVESTIGATIONS.

An irrigable acreage survey of the entire project was completed and section plats worked up. Other surveys consisted of the final location of parts of the main canal which are to be reconstructed, and the location of a construction road which will be used for the project operation and maintenance road after construction is completed.

SEEPAGE AND DRAINAGE.

At the time the Government took over the reconstruction of the project one open drain about 0.3 mile long had been constructed. This drain protected about 600 acres of land in the Pasadena Valley. No more drains are contemplated.

BOARD MEETINGS.

Date.	Subject.	Personnel.
1917. Sept. 12	King Hill reconstruction	D. C. Henny, J. L. Savage, J. H. Miner.
Oct. 29	Estimate to completion	D. C. Henny, James Munn, J. H. Miner.
1918. Apr. 17	Construction program	James Munn, W. Ward, J. H. Miner.
Apr. 18	Equipment for King Hill project	Do.
May 27	Changes in construction	J. H. Miner, Walter Ward, J. L Savage.

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[1] Includes refunds, etc , and amount allotted from appropriation for increased compensation, 1918.

OPERATION AND MAINTENANCE.

All operation and maintenance work is done by the irrigation district. On account of the bad condition of the original main canal structures, very poor deliveries were made.

SETTLEMENT.

Very few new settlers have moved onto the project on account of the uncertainty of the water service, although quite an amount of land has been changing hands.

Settlement data, King Hill project.

[Based largely on estimates.]

Item.	1917	1918
Total number of farms on project	225	225
Population	350	350
Number of irrigated farms	125	125
Operated by owners or managers	110	110
Operated by tenants	15	15
Number of towns	3	3
Population	1,350	1,425
Total population in towns and farms	1,700	1,775
Number of public schools	4	4
Number of churches	4	4
Number of banks	1	1
Total capital stock	$20,000	$20,000
Amount of deposits	....	$183,436
Number of depositors	....	758

PRINCIPAL CROPS.

The principal crops grown on the project during 1917 were alfalfa, wheat, potatoes, fruit, melons, cantaloupes, and garden stuffs. The acreage of alfalfa predominates, and very good prices were received. The season on the project is such that garden stuffs and potatoes can be put on the market very early. Early potatoes sold for as high as 8 cents per pound. There was an abundance of fruit on the project; consequently the prices were rather low. Melons and cantaloupes were plentiful and brought good prices.

Crop report, King Hill project, Idaho, year of 1917.

[Based on reports for 2,242 acres.]

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	485	Tons	2,484	5.16	$14.02	$34,273	$72.32
Apples	216.5	Pounds	151,350	699.1	.016	2,412	11.14
Beans	2.65	Bushels	323	123.5	.64	207	79.01
Clover hay	16.5	Tons	825	5.00	12.50	412	62.50
Clover seed	4	Bushels	28	7.00	13.00	364	91.00
Indian corn	8.3	...do	205	24.69	2.53	519	62.47
Corn fodder	3	Tons	7	2.33	6.58	46	15.33
Fruits, small	8.75	Pounds	6,645	759.4	.18	1,205	137.71
Garden	13.75	....	....	....	....	1,355	98.54
Oats	6	Bushels	320	....	.99	318	53.00
Pasture	211.5	....	....	....	....	1,150	6.81
Peaches	12.8	Pounds	15,506	1,211.6	.061	956	74.71
Pears	.4	...do	2,300	5,750.00	.017	40	100.00
Prunes	1.1	...do	500	....	.03	15	13.63
Potatoes, white	31.75	...do	19,930	....	.025	4,998	157.41
Potatoes, sweet	1	...do	300	....	.05	15	15.00
Wheat	60	Bushels	1,547	25.78	....	2,841	47.35
Watermelons	10	Pounds	56,265	....	.012	750	75.00
Total cropped	1,093	Total and average				51,876	47.46

Crop report, King Hill project, Idaho, year of 1917—Continued.

		Areas.	Acres.	Farms.
Irrigated, no crop	492	Total irrigable area farms reported (owners' figure).	2,242	39
		Total irrigated area farms reported	1,585	39
Total irrigated	1,585	Total cropped area farms reported	1,092.97	

FINANCIAL STATEMENT.

Project balance sheet, King Hill project, June 30, 1918.

Inventory of stock on hand		$61,848.15
Accounts receivable		1,924.22
Construction cost	$170,896.28	
Less construction revenue earnings	896.40	
		169,999.88
Total		233,772.25
Accounts payable		16,248.66
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	$227,679.45	
Collection, transfer, refund, and joint construction vouchers issued	10,155.86	
Net investment		217,523.59
Total		233,772.25

Feature costs of King Hill project, King Hill, Idaho, to June 30, 1918.

Principal feature	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examinations and surveys	$18,422.19	$20,412.99
Canal system: Main canal		68,317.83
Four-mile flume, station 759+49 to station 927+28	24,970.72	
Wasteway at station 923	2,529.76	
Roads for canal operation	12,481.11	
Wood-stave flume, below Deer Gulch	3,573.90	
Gunite flume, station 1389+ to station 1404+	12,107.52	
Wasteway at station 1391	934.38	
Canal enlargement, station 1363 to 1389+ and station 1404+ to station 1424	3,200.17	
Canal surveys	8,520.27	
Farm units	2,910.78	2,910.78
Permanent improvements, King Hill, Idaho		10,857.01
Lands, building sites	1,443.74	
Warehouse	3,144.32	
Garage	1,529.25	
Employees' cottages, type B (3)	2,849.19	
Employees' cottages, type A (1)	1,890.51	
Balance in plant accounts	51,629.07	53,428.33
Unadjusted clearing accounts	14,272.71	14,969.34
Gross cost to June 30, 1918	166,409.59	170,896.28
Less revenues earned during construction period:		
Rental of buildings	259.65	259.65
Profit on hospital operations	634.50	636.75
Total revenues	894.15	896.40
Net cost		169,999.88

Statement of cost, by calendar years, King Hill project.

Year ending Dec. 31—	Construction.
1916	$1,687.94
1917	21,530.80
Jan. 1 to June 30, 1918	79,279.87
Plant accounts to June 30, 1918	53,428.33
Unadjusted clearing accounts to June 30, 1918	14,969.34
Total	170,896.28

Statement of cost, by fiscal years, King Hill project.

Year ending June 30—	Construction.
1916	738.39
1917	1,252.41
1918	100,507.81
Plant accounts to June 30, 1918	53,428.33
Unadjusted clearing accounts to June 30, 1918	14,969.34
Total	170,896.28

Estimated cost of contemplated work, King Hill project, during fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys		$1,000
Investigation of capacity of gunite and wooden flumes	$1,000	
Canal system		418,000
Replacement Big Pilgrim siphon	34,000	
Continuing construction of Bench flume	274,000	
Repairing siphons No. 1, 3 concrete siphon at station 171 and Little Pilgrim Gulch	30,200	
Completion of surveys, Main Canal below 4 Mile flume, for detail estimates to determine cost of placing system in safe operating condition	4,000	
For road, bridges, etc., necessary in connection with construction work	15,000	
Minor structures in Main Canal	1,800	
For repairing King Hill Bridge, for transportation of material to work	4,000	
For completion of Deer Gulch siphon	23,000	
Concrete and gunite lining	32,000	
For constructing employees' cottages and the purchase of lots for same	9,000	9,000
For telephone line reconstruction necessary in connection with construction of Main Canal only	8,000	8,000
Total		436,000

IDAHO, MINIDOKA PROJECT.

BARRY DIBBLE, project manager, Burley, Idaho.

LOCATION.

Counties: Minidoka and Cassia, Idaho; Jackson Lake Reservoir, Lincoln, Wyo.

Townships: 8 to 11 S., Rs. 22 to 25 E., Boise meridian; Jackson Lake Reservoir, Tps. 44 to 46 N., Rs. 114 to 116 W., sixth principal meridian, Wyoming.

Railroads: Oregon Short Line.

Railroad stations and estimated population June 30, 1918: Rupert, 2,000; Heyburn, 300; Burley, 3,500; Paul, 350; Declo (Marshfield), 150; and Acequia, 50.

WATER SUPPLY.

Source of water supply: Snake River, supplemented by storage.

Area of drainage basin: 22,600 square miles above diversion dam.

Annual run-off, in acre-feet, of Snake River at Montgomery's Ferry and Neeley (16,000 square miles), 1896 to 1917: Maximum, 8,230,000; minimum, 3,827,000; mean, 6,361,000, South Fork of Snake River at Moran, Wyo. (980 square miles), 1904 to 1917: Maximum, 1,530,000; minimum, 727,410; mean, 1,125,300.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1918, 121,000 acres.

Area under water-right applications and rental contracts, season of 1918: 118,964 acres.

Length of irrigation season: From April 1 to October 31—214 days.

Average elevation of irrigable area: 4,225 feet above sea level.

Rainfall on irrigable area: 12¾ years, average 12.54 inches: 1917, 11.92 inches.

Range of temperature on irrigable area: −15° to 100° F.

Character of soil of irrigable area: On north side of river, sand and sandy loam predominate; about one-third of the area is clay loam; on south side of river the soil is a disintegrated ash.

Principal products: Alfalfa, grasses, rye, wheat, oats, sugar beets, and potatoes.

Principal markets: Pocatello, Idaho; Salt Lake City, Utah; Butte and Helena, Mont.; Portland, Oreg.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto (gravity unit): Public notices—March 9, 1907; November 23, 1908; February 11, March 30, 1909; February 7, March 22, June 10, October 13, November 3, and 25, 1910; January 23, December 30, 1911; March 21, 1912; June 23, 1913; September 24, 1914; February 27, March 20, 1915; March 4, May 4, May 27, June 10, June 22, June 26, October 2, November 22, 1916; March 26, 1917. Orders—July 19, December 10, 1907; July 9, 1908; December 27, 1910; March 18 and 31, May 4, June 8, 1911; February 26, March 19 and 25, July 21, 1913; January 19, March 26 and 31, 1914; March 8, 1915; April 7, June 26, 1916; March 23, 1917.

South side pumping unit: Public notices—November 3, 1915; May 25, 1916; April 10, 1917; April 2, 1918. Orders—March 24, 1911; March 19, May 13, October 10, 1912; March 25, 1913; March 23, 1914; March 1, 1915; March 23, 1917.

Location of lands opened: Tps. 8 to 11 S., Rs. 22 to 25 E., Boise meridian.

The annual operation and maintenance charge is based on the amount of water used. For 1918 the gravity unit which is being operated by the Minidoka irrigation district, with headquarters at Rupert, Idaho, has been divided into seven zones, based on soil conditions, in which 2 to 8 acre-feet of water are allowed for the minimum annual charge, this minimum charge to be determined at the end of the irrigation season. On the pumping unit the rate for 1918 and thereafter until further notice, as set by public notice dated April 2, 1918, is 50 cents per acre-foot used up to and including June 5 and $1 per acre-foot for water used after June 5 and on or before October 20, with a minimum of $1.50 per acre for each irrigable acre, whether water is used or not. Provisions are made for the use of water after October 20, which is optional with the water users, at the rate of $2 per day for each farm unit of 80 acres or fraction thereof, provided the charges for this service are deposited with the special fiscal agent before receiving the water. No service will be commenced, however, unless deposits aggregating $200 per day for a reasonable period shall be made before October 20. No lands are operated on a rental basis.

CHRONOLOGICAL SUMMARY.

First surveys with reference to storage possibilities in 1902.
Reconnoissance and preliminary surveys for main project begun March, 1903.
Construction recommended by board of engineers March 21, 1904.
Construction authorized by Secretary April 23, 1904.
Minidoka Dam completed September, 1906.
Temporary dam on the Moran site, Jackson Lake, completed in 1907.
First irrigation by Reclamation Service season of 1907.
Jackson Lake Dam completed November 25, 1911.
Contract for enlargement of Jackson Lake Reservoir entered into February 25, 1913.
Enlargement of Jackson Lake Reservoir completed December, 1916.
Gravity unit 99.7 per cent completed June 30, 1918, including drainage.
South side pumping unit 94.8 per cent completed June 30, 1918.
Jackson Lake storage 93.6 per cent completed June 30, 1918.
Commercial unit 24 per cent completed June 30, 1918.
Entire project (except extensions) 90.5 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Minidoka project provides for the diversion of the waters of the Snake River by a combined storage, diversion, and power dam about 6 miles south of Minidoka, Idaho, into two canal systems, one on either side of the river, watering lands in the vicinity of Acequia, Rupert, Heyburn, Paul, Declo, and Burley, Idaho. Power developed at the dam is utilized primarily for pumping water from the canals to irrigate high lands, but also for pumping for drainage purposes and for furnishing heat, light, and current for commercial use to the towns on the project and the farms adjacent to them. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith. Storage for the project is provided mainly by a reservoir constructed in the upper drainage basin of Snake River, at Jackson Lake, Wyo. This is supplemented by the reservoir formed by the Minidoka Dam and known as Lake Walcott. Jackson Lake Dam, as originally planned, and Minidoka Dam are completed. Jackson Lake Dam has been raised 17 feet, making the capacity of the reservoir 790,000 acre-feet. The irrigation system for the gravity unit and the south side pumping unit and the drainage system for the gravity unit have been completed.

SUMMARY OF GENERAL DATA FOR MINIDOKA PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:		
Irrigable acreage when project is complete		121,005
Public land entered to end of fiscal year	96,016	
Public land open to entry at end of fiscal year	552	
State land	21,062	
Private land	3,375	
Acreage service could have supplied season of 1917		120,852
Addition in fiscal year, 1918		152
Estimated addition in fiscal year, 1919		400
Estimated acreage service can supply July 1, 1919		121,404
Acreage actually irrigated, season of 1917		99,020
Acreage cropped under irrigation, season of 1917		92,456
Crops:		
Value of irrigated crops, season of 1917		$5,119,043.00
Value of irrigated crops, per acre cropped		$55.37

Finances:			
Net construction cost to end of fiscal year			$5,720,690.44
Per cent complete at end of fiscal year			90.5
Appropriated for fiscal year 1919, total			$489,000.00
Allotment for construction, fiscal year 1919			$327,000.00
Estimated per cent complete, June 30, 1919			95
Proposed appropriation, fiscal year 1920, for construction			$480,000.00
Estimated total construction expenditures to June 30, 1920			$6,340,000.00
Estimated per cent complete, June 30, 1920			97
Announced construction charges per acre			$22, $30, $40, $42, $52, $56.50, $57.50, and $65.
Appropriation, fiscal year 1918			$282,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$198,832.89		
Transfers	26,444.83		
		$225,277.72	
Registered liabilities chargeable to 1918 appropriation		26,013.92	
Contingent liability		18,000.00	
			$269,291.64
Unencumbered balance, July 1, 1918			12,708.36
Repayments:			
Value of construction water-right contracts			$5,551,233.32
Construction charges—			
Accrued to end of fiscal year			[1] $859,045.92
Collected to end of fiscal year			[2] 842,823.61
Uncollected at end of fiscal year			[3] 16,222.31
Operation and maintenance charges (public notice)—			
Accrued to end of fiscal year			$630,697.15
Collected to end of fiscal year			503,556.19
Uncollected at end of fiscal year			127,140.96
Water-rental charges—			
Accrued to end of fiscal year			$230,380.27
Collected to end of fiscal year			227,367.52
Uncollected at end of fiscal year			3,012.75
Power earnings—			
Accrued to end of fiscal year			$185,493.40
Collected to end of fiscal year			172,865.35
Uncollected at end of fiscal year			12,628.05
Drainage:			
Estimated acreage damaged by seepage to end of fiscal year			543
Miles of drains built to end of fiscal year, open			109
Estimated acreage protected by drains built to end of fiscal year.			30,000
Estimated acreage to be protected by authorized system			30,000
Cost of drainage works to end of fiscal year			$749,429.74

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[1] Includes $73,634.85 supplemental construction charges to be collected as operation and maintenance.

[2] Includes $73,169.92 supplemental construction charges collected as operation and maintenance, also credit of $210 for work taken up on joint construction vouchers.

[3] Includes $464.93 supplemental construction operation and maintenance charges uncollected.

CONSTRUCTION DURING FISCAL YEAR.

Gravity system.—Under the terms of the contract entered into between the Reclamation Service and the Minidoka irrigation district, dated December 2, 1916, the district assumed the operation and maintenance of the gravity unit. All future work on this unit is to be handled by the district and paid for by them out of operation and maintenance funds.

During the fiscal year the reclamation service completed the construction of the irrigation system on this unit; 32 structures were erected by the service, of which 4 were of concrete and 28 of wood. These included turnouts, tap boxes, flumes, measuring devices, etc. New laterals constructed amounted to 0.23 mile. Three potato cellars were built during the year, two at Rupert, each having a capacity of 16 cars and one at Acequia of 10 cars capacity. These were built on the cooperative plan, the service and the farmers each subscribing one-half of the cost and the service supervising the erection. The Government and subscribers are to be reimbursed from rentals received for the storage of potatoes, and the cellars are finally to become part of the project.

South side pumping.—All construction on the irrigation system of this unit was completed by the end of the fiscal year. During the year 211 structures were built, of which 8 were concrete and 203 of wood. These included wasteways, turnouts, flumes, bridges, measuring devices, etc. No new laterals were constructed during the year.

Commercial power.—The use of electricity for commercial power purposes has increased rapidly during the past year.

At Rupert, with a station of 1,500 kilowatts rated capacity, the load during the winter was equal to the maximum capacity of the station, 2,000 kilowatts, and could have been greatly increased if transformer capacity had been available.

At Burley, 3 new 400-kilovolt amperes transformers were installed in September. With this increase the capacity of the station is 2,250 kilowatts, and a load of 2,650 kilowatts was shown for February.

At Paul the capacity of the temporary station had to be increased from 120-kilovolt amperes to 225-kilovolt ampere to care for the increase in load, which was 200 kilowatts at its maximum. The permanent steel and concrete station is fast nearing completion. This station will have a capacity of 450-kilovolt amperes, and it is expected that it will be fairly well loaded by the end of the calendar year, as the town of Paul is growing rapidly.

A new masonry substation has been completed in the mountains 9 miles from Albion for furnishing power to the Melcher Mining & Milling Co. This station has a capacity of 600-kilovolt amperes, using transformers transferred from the Boise project. This company agrees to take 120 kilowatts during the summer and 200 kilowatts during the rest of the year, and there is a prospect for a considerable increase.

A new out-door steel-tower substation with a capacity of 30-kilovolt amperes has been built for the Unity Light & Power Co., a group of 100 farmers forming a mutual company.

During the fiscal year 1918 there have been approved 28 contracts for the sale of power. These range in agreed demand from 1 to 200 kilowatts. Among these are several contracts with groups of farmers who have formed mutual companies as follows: Unity Light & Power Co., West End Power Co., Fruitland Driver Power & Light Co., North Heyburn Electric Co., Riverside Electric Co., East End Mutual Electric Co., Declo Light & Power Co., and Central Electric Co., representing in all approximately 400 farmers.

The revenue from the sale of electricity during the fiscal year 1918 amounted to about $56,800, as compared with $40,000 for the fiscal year 1917.

A study of the connected load on the commercial lines as of January 1, 1918, showed conditions as follows:

Summary sheet connected load for January 1, 1918, in kilowatts.

Contract.	Lighting.	Appliances.	Power.	Heat.	Total.
Ernest B. Skinner	24.335	33.595	72.45	122	252.380
Rupert Electric Co	230.430	244.895	258.44	1,677	2,410.765
City of Burley	341.695	769.070	366.20	2,361	3,837.965
Amalgamated Sugar Co	5.245	11.800	202.95	12	231.995
Minidoka North Side Power Co	2.465	6.425	.19	12	21.080
Paul Electric Co	58.055	62.485	141.45	191	452.990
Farmers Electric Co	1.000	2.425	.19	....	3.615
Schodde Electric Co	3.555	5.225	18.80	....	27.580
Marshfield	33.095	29.600	39.56	....	102.255
Acequia	5.015	2.965	1.50	....	9.480
Albion	126.460	272.251	13.56	271	683.271
Rural Electric Co	6.980	9.725	.68	....	17.385
Unity Light & Power Co	4.295	6.275	1.69	....	12.260
West End Power Co	2.090	2.900	2.25	....	7.240
Fruitland Driver Power Co	.865	1.385	....	....	2.250
Small contracts	9.400	31.430	8.61	26	75.440
Total	854.980	1,492.451	1,128.52	4,672	8,147.951

SEEPAGE AND DRAINAGE.

Another year's operation of the drainage system shows that this has satisfactorily met all requirements for which it was designed. A few complaints, however, have been made that some of the land has been drained too much, requiring more frequent irrigation. This is especially so in the lighter soils underlaid with gravel. During 1917 the system discharged 72,988 acre-feet of water. This shows a decrease of 20,995 acre-feet from that of 1916, due possibly to the more economical use of water during 1917.

OPERATION AND MAINTENANCE.

Gravity unit.—The operation and maintenance of this unit was taken care of by the Minidoka irrigation district and the work has been handled in a careful and conscientious manner. During the fall of 1917 and early part of 1918 a considerable force was employed in clearing ditches and putting the system in shape for the 1918 season. Water was turned into the north side main canal March 27, 1918.

South side pumping unit.—The operation and maintenance of this unit continues under the supervision of the Reclamation Service. During the fall of 1917 and spring of 1918 a fairly large force was continually employed in removing willow growth and cleaning of ditches and in general putting the system in shape for the 1918 season. The winter was comparatively mild and work was carried on almost continuously throughout the winter season. Considerable difficulty was experienced in securing labor owing to scarcity of men. The irrigation season commenced somewhat earlier this year than in 1917; the south side pumping stations were started April 20, 1918.

There were no serious breaks in the canals during the year.

Historical review, Minidoka project.

Item.	1913	1914	1915	1916	1917	1918
Acreage for which service was prepared to supply water	116,660	117,000	120,000	120,300	120,852	121,000
Acreage irrigated	76,000	81,500	83,562	89,900	99,020	[1] 108,000
Miles of canal operated	457	520	590	615	633.19	634.39
Water diverted (acre-feet)	489,200	604,000	609,434	640,432	616,228	....
Water delivered to land	383,000	353,000	323,479	334,649	305,278	....
Per acre of land irrigated (acre-feet)	5.0	4.3	3.9	3.7	3.1	....

[1] Estimated.

SETTLEMENT.

The prosperous conditions that prevailed during the previous two years prevailed throughout the 1918 fiscal year. Good prices were received for all farm produce with the exception of potatoes, which were in many cases a loss. The population continued to increase. The number of people on the farms was estimated at approximately 8,000 and those in towns at 6,350.

All towns have made a substantial growth during the year. In Burley there were constructed a new city hall, a modern theater, two churches, several business blocks, and several miles of concrete side and curb, and the business section of the town is being paved at this time.

In Rupert several new business blocks were constructed and a modern sewerage system is being installed. In Declo two business blocks were constructed and one bank building. In Acequia several new residences were erected, and at Paul the sugar factory was completed; also there were several business houses, including a picture-show building, a bank building, and a modern hotel building. Some concrete walks were also laid. These towns are all lighted with electricity furnished by the Reclamation Service and a large percentage of the buildings in them are also heated by electricity.

In Cassia County many miles of gravel highway were constructed, and the roads on the south side pumping unit are generally in very fine condition. In Minidoka County there has been very little road improvement.

Land values have advanced steadily and range from $50 to $350 per acre, depending largely upon the state of cultivation and the improvements.

Settlement data, Minidoka project.

Item.	1914.	1915.	1916.	1917.	1918.
Total number of farms on project	2,113	2,164	2,322	2,327	2,340
Population	5,200	5,800	6,468	7,467	[1] 8,000
Number of irrigated farms	1,741	1,713	1,760	2,195	....
Operated by owners or managers	1,525	1,402	1,352	1,725	....
Operated by tenants	216	311	408	470	....
Population	5,200	5,800	5,800	7,467	[1] 8,000
Number of towns	5	5	5	7	7
Population	3,000	3,500	4,100	5,300	[1] 6,350
Total population of towns and farms	8,200	9,300	10,568	12,667	14,350
Number of public schools	21	21	21	20	21
Number of churches	13	21	21	25	25
Number of banks	6	6	6	6	8
Total capital stock	$137,500	$140,000	$140,000	$165,000	$240,000
Amount of deposits	577,007	821,909	1,311,641	2,522,764	2,543,343
Number of deposits	4,119	4,721	6,370	7,350	10,663

[1] Estimated.

PRINCIPAL CROPS.

The total production and crop value for the year 1917 were the highest in the history of the project. The area cropped on the gravity unit showed an increase of 7,310 acres or 16.5 per cent over that of 1916; the south side pumping unit also showed an increase of 3,784 acres or 10. 2 per cent over that of 1916. The average yield per acre of all the principal crops averaged with that of 1916. The average unit price paid for the crops showed an increase of about 49 per cent over that of last year. The average value per acre on the gravity unit was $57.58, on the pumping unit $52.55, and for the whole project was $55.37, or more than 61 per cent higher than in 1916. Of the principal crops, potatoes had the highest value, amounting to a little better than $160 per acre. Sugar beets showed a decrease in acreage but stood second in value with more than $84 per acre. Alfalfa continued to remain the principal crop, showing an increase over 1916 of 4,907 acres or 12.9 per cent, producing 45 per cent of the total crop value of the project. In total value potatoes, sugar beets, and wheat followed in the order named:

Crop report, gravity unit, Minidoka project, Idaho, year of 1917.

[Data furnished by Minidoka irrigation district.]

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	25,957	Ton	96,809	3.7	$15.00	$1,452,135	$56.00
Alfalfa seed	173	Bushel	1,065	6.1	9.00	9,585	55.40
Apples	590	Pound	782,108	1,326	.02	15,642	26.50
Barley	780	Bushel	20,105	25.8	1.00	20,105	25.80
Beans	773	...do	19,930	25.8	6.00	119,580	154.80
Sugar beets	2,753	Ton	35,364	12.8	7.00	247,548	89.90
Clover hay	1,135	...do	3,501	3.1	15.00	52,515	46.20
Clover seed	696	Bushel	4,018	5.8	14.00	56,252	80.90
Small fruits	18	Pound	18,000	1,000	.15	2,700	150.00
Corn	132	Bushel	3,267	24.6	1.00	3,267	24.70
Garden	555					45,173	81.40
Oats	2,957	Bushel	85,502	28.9	.80	68,402	23.10
Onions	34	...do	1,865	54.8	2.40	4,476	131.60
Pasture	4,647					71,728	15.40
Peas	134	Bushel	1,601	11.9	3.00	4,803	35.80
Potatoes	2,940	...do	601,756	204.6	.75	451.317	153.50
Rye	166	...do	1,807	10.9	1.00	1,807	10.90
Wheat	5,553	...do	128,276	23.1	1.78	228,331	41.10
Miscellaneous	1,553					110,229	71.00
Mangles	129	Ton	2,038	15.8	5.00	10,190	79.00
Total cropped	51,675	Total and average				2,975,785	57.58

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Total irrigable area farms reported	70,140.75	1,407	97.5
New alfalfa	4,645	Total irrigated area farms reported	55,800	1,407	77.6
Young clover	35	Under water-right applications	55,800	1,407	77.6
Nonbearing orchard	384	Total cropped area farms reported.	51,675	1,407	71.9
Fall plowed	340	Ultimate irrigable area	71,890.49		100
Less duplicated areas	1,279				
Total irrigated	55,800				

Crop report, south side pumping unit, Minidoka project, Idaho, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	16,803	Ton	56,374	3.4	$15.00	$845,610	$50.32
Alfalfa seed	32	Bushel	116	3.6	9.00	1,044	32.62
Apples	94	Pound	85,813	913	.02	1,716	18.25
Barley	550	Bushel	11,358	20.6	1.00	11,358	20.65
Beans	113	..do	1,216	10.8	6.00	7,296	64.56
Beets	2,126	Ton	23,825	11.2	7.00	166,775	78.44
Clover	992	..do	2,063	2.1	15.00	30,945	31.19
Clover seed	2,398	Bushel	8,955	3.7	14.00	125,370	52.28
Corn	7	..do	160	22.8	1.00	160	22.85
Corn fodder	17	Ton	75	4.4	10.00	750	44.12
Fruits, small	3	Pound	2,450	816	.15	368	122.50
Garden	390	....	....	....	....	26,415	67.73
Hay	77	Ton	101	1.3	15.00	1,515	19.66
Oats	1,726	Bushel	46,814	27.1	.80	37,451	21.69
Onions	14	..do	1,002	71.5	2.40	2,405	171.77
Pasture	2,775	....	....	....	....	48,222	17.38
Peas	390	Bushel	4,048	10.4	3.00	12,144	31.14
Potatoes	2,906	..do	647,975	223	.75	485,981	167.23
Wheat	9,524	..do	189,030	19.8	1.78	336,473	35.33
Mangles	16	Ton	252	15.8	5.00	1,260	78.75
Less duplicated areas	172	....	....	....	....	....	....
Total cropped	40,781	Total and average				2,143,258	52.55

		Areas.	Acres.	Number farms.	Per cent of project.
Irrigated, no crop:		Total irrigable area farms reported	46,569	788	95
Nonbearing orchard	130	Total irrigated area farms reported	43,220	788	88
Young alfalfa	1,455	Under water-right applications	43,220	788	88
Young clover	165	Total cropped area farms reported	40,781	788	83
Fall plowed	424				
Miscellaneous	1,405				
Less duplicated areas	1,140				
Total irrigated	43,220				

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, APRIL 2, 1918.

1. **Annual operation and maintenance charges.**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charges for the irrigation season of 1918 and thereafter until further notice against all lands of the south side pumping unit, Minidoka project, Idaho, under public notice, shall be as follows: Fifty cents per acre-foot for all water delivered on or before June 5, and $1 per acre-foot for all water delivered after June 5 and on or before October 20: *Provided, however,* That there shall be a minimum charge of $1.50 against each irrigable acre whether water is used thereon or not, which minimum charge will be applied in payment of the charges under the acre-foot rates.

2. **Optional water service.**—Until further notice, after October 20 of each season no water will be furnished except upon request, and at an additional charge for each farm unit of 80 acres or fraction thereof, of $2 for each day of water service given: *Provided, however,* That every person desiring this service shall, before receiving same,

deposit with the special fiscal agent of the United States Reclamation Service, at Burley, Idaho, a sum of money sufficient to cover the number of days that he desires water and designate the turnout where he wishes to have the water delivered and the size of stream he will require. So far as may be practicable, water will be delivered to each depositor for the days covered by his deposit, but whenever the aggregate deposits for any day are less than $200, delivery of water will cease and will not thereafter be resumed. Any unused deposits will be returned to the persons by whom they were made. This service will not be commenced, however, unless deposits aggregating $200 per day for a reasonable period shall be made prior to October 20.

E. C. Bradley,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Minidoka project, June 30, 1918.

Cash			$28,152.08
Inventory of stock on hand			39,321.11
Accounts receivable			5,284,447.31
Construction cost		$5,884,683.98	
Less construction revenue earnings	$162,200.15		
Less cost adjustments	1,793.39		
		163,993.54	5,720,690.44
Operation and maintenance cost		793,582.70	
Less operation and maintenance revenue earnings		97,411.54	
			696,171.16
Total			11,768,782.10
Accounts payable			40,313.33
Contingent obligations			28,147.03
Reserves for repayment to reclamation fund of cost of project			6,627,773.54
Miscellaneous accruals			239,225.18
Capital investment:			
Disbursement, transfer, and joint construction vouchers received		$6,867,442.99	
Collection, transfer, refund, and joint construction vouchers issued		2,034,119.97	
Net investment			4,833,323.02
Total			11,768,782.10

Feature costs of Minidoka project to June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys	$5,463.97	$96,184.81
Storage works	15,907.47	
Jackson Lake Dam		416,085.24
Jackson Lake Bridge		33,316.89
Deepening river channel		12,962.47
	15,907.47	462,364.60
Pumping for irrigation:		
Five small pumping stations, gravity unit		29,521.47
South side pumping stations		474,047.96
		503,569.43
Canal system	4,507.48	
Minidoka Dam		676,331.37
Main north side canals		746,154.58
Main south side canals		329,579.88
Feeders to south side pumping station		77,489.85
	4,507.48	1,829,555.68

Feature costs of Minidoka project to June 30, 1918—Continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Lateral system	10,825.29	
Gravity unit		540,961.88
Pumping unit		577,270.78
	10,825.29	1,118,232.66
Drainage system	96.34	749,429.74
Power system	36,341.22	
Power house		452,463.43
Transmission lines		105,604.02
Substations		70,342.12
	36,341.22	628,409.57
Permanent improvements and lands	14,928.76	116,463.15
Telephone system		28,396.01
Operation and maintenance during construction		330,353.90
Balance in plant accounts	11,630.53	21,770.41
Unadjusted clearing accounts	[1] 45.98	[1] 45.98
Gross cost	99,655.08	5,884,683.98
Less revenues earned during construction period:		
Rental of buildings	2,432.07	11,215.75
Rental of grazing and farming lands	5,240.80	6,909.21
Rentals of irrigation water	2,259.84	134,083.07
Contractors' freight refunds		552.39
Other revenues, unclassified	257.00	9,439.73
Profit on hospital operations	60.25	1,793.39
	10,249.96	163,993.54
Net cost to June 30, 1918		5,720,690.44

Statement of Minidoka project cost, by calendar years.

Year ending Dec. 31—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1903	$26,111.96				$26,111.96
1904	83,053.65				83,053.65
1905	505,805.94				505,805.94
1906	736,028.48				736,028.48
1907	439,598.02		$25,510.51	$25,510.51	465,108.53
1908	367,628.31		35,279.52	35,279.52	402,907.83
1909	731,680.54	$22,084.23	37,485.35	59,569.58	791,250.12
1910	517,542.12	57,654.75	48,043.74	105,698.49	623,240.61
1911	284,875.36	51,010.78	36,515.54	87,526.32	372,401.68
1912	183,969.35	68,250.72	41,239.03	109,489.75	293,459.10
1913	192,249.55	69,894.50	46,271.39	116,165.89	308,415.44
1914	471,258.78	107,023.28	83,874.99	190,898.27	662,157.05
1915	128,886.24	81,479.25	133,244.58	214,723.83	343,610.07
1916[1]	17,868.26	[2] 127,043.61	1,021,344.02	894,300.41	912,168.67
1917	822,048.01		[2] 753,124.44	[2] 753,124.44	68,923.57
January to June, 1918	24,001.08		37,898.47	37,898.47	61,899.55
Total	5,532,605.65	330,353.90	793,582.70	1,123,936.60	6,656,542.25
Unadjusted clearing accounts	[2] 45.98				[2] 45.98
Undistributed plant	21,770.41				21,770.41
Grand total	5,554,330.08	330,353.90	793,582.70	1,123,936.60	6,678,266.68

[1] Drainage construction transferred to construction costs from operation and maintenance under public notice.

[2] Deduct.

Statement of cost, by fiscal years, Minidoka project.

Year ending June 30—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1903	$8,849.33				$8 849.33
1904	34,525.27				34,525.27
1905	131,582.02				131,582.02
1906	880,029.87				880,029.87
1907	592,027.09				592,027.09
1908	287,168.95		$39,911.00	$39,911.00	327,079.95
1909	641,398.19		44,395.26	44,395.26	685,793.45
1910	596.840.30	$53,126.64	84,425.01	137,551.65	734,391.95
1911	404,546.60	27,529.08	138,968.90	166,497.98	571,044.58
1912	201,701.53	5,090.26	213,804.73	218,894.99	420,596.52
1913	200,588.23	[2] 1,509.88	266,003.09	264,493.21	465,081.44
1914	484,982.89	[2] 560.69	359,740.10	359,179.41	844,162.30
1915	158,725.34		316,177.13	316,177.13	474,902.47
1916	773,561.94		200,101.98	200,101.98	973,663.92
1917[1]	48,007.57	[1] 246,678.49	[2] 972,155.91	[2] 725,477.42	[2] 677,469.85
1918	99,655.08		102,211.41	102,211.41	201,866.49
Total	5,544,190.20	330,353.90	793,582.70	1,123,936.60	6,668,126.80
Plant accounts to June 30, 1917	10,139.88				10,139.88
Grand total	5,554,330.08	330,353.90	793,582.70	1,123,936.60	6,678,266.68

[1] Drainage cost transferred from operation and maintenance under public notice to construction.
[2] Deduct.

Estimated cost of contemplated work, Minidoka project, during fiscal year 1919.

Principal feature.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principa feature.
Examination and surveys		$7,000
Storage works: Jackson Lake, deepening of river channel	$30,000	30,000
Pumping for irrigation [1]		
Canal system [1]		
Lateral system [1]		
Drainage system [1]		
Flood protection	None.	
Power system:		
Power house	250,000	
Substations	15,000	
Transmission lines	15,000	280,000
Farm units [1]		
Permanent improvements:		
4 cottages at dam	8,000	
1 cottage south side pumping station	2,000	10,000
Telephone system [1]		
Operation and maintenance [1]		
Operation and maintenance under public notice		150,000
Plant and equipment		10,000
Hospitals		500
Other reimbursable		1,500
Total		489,000

[1] Complete.

Operating costs and revenues, Minidoka project, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works	$17,540.03	$3,082.69	$20,622.72	$59,789.10	$3,112.36	$62,901.46
Pumping for irrigation	34,492.24		34,492.24	213,258.14	114,096.95	327,355.09
Canal system	6,937.42	3,328.99	10,266.41	38,389.27	81,284.43	119 673.70
Lateral system	15,314.76	39,467.41	54,782.17	244,786.19	412,914.13	657,700.32
Drainage system				29,646.42	35,688.91	65,335.33
Undistributed expense					9,806.25	9,806.25
Gravity unit superintendence	1,629.84		1,629.84	4,791.64		4,791.64
Operation and maintenance during construction				[2] 165,176.95	[2] 165,176.95	[2] 330,353.90
Drainage, operation and maintenance during construction				[2] 17,588.63	[2] 17,588.64	[2] 35,177.27
Unadjusted expense [1]			[2] 920.55	[2] 460.27	[2] 460.28	[2] 920.55
Cost of producing commercial power				[2] 43,764.68	[2] 43,764.69	[2] 87,529.37
Cost of producing commercial power to Dec. 31, 1917, transferred in June, 1918			[2] 18,661.42			
Total	75,914.29	45,879.09	102,211.41	363,670.23	429,912.47	793,582.70

[1] June costs transferred from G. L. 160 in July.

[2] Deduct.

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$161,646.12	$630,697.15
Operation and maintenance charges paid in advance by water-right applicants	[1] 42.32	.05
Operation and maintenance charges paid and forfeited by water-right applicants	14.44	2,349.36
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	596.57	3,576.32
Rental of buildings during operating period	60.00	1,087.11
Rental of irrigation water	517.97	96,297.20
Accrued and unpaid operation and maintenance accruals transferred to and added to construction charges		
Other revenues unclassified, earned during operating period	27.23	27.23
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants	[1] 971.88	[2] 6,154.93
Total	161,848.13	727,879.49
Difference (deficit)		65,703.21

[1] Deduct.

MONTANA, HUNTLEY PROJECT.

R. H. Fifield, project manager, Huntley, Mont.

LOCATION.

County: Yellowstone.

Townships: 2 and 3 N., Rs. 27 to 31 E., Montana meridian.

Railroads: Northern Pacific; Chicago, Burlington & Quincy.

Railroad stations and estimated population June 30, 1918: Huntley, 200; Osborn;[1] Worden, 150; Newton;[1] Pompeys Pillar, 120; Bull Mountain;[1] Ballantine, 120; and Anita,[1] Mont.

WATER SUPPLY.

Source of water supply: Yellowstone River.

Area of drainage basin: 12,000 square miles.

Annual run-off in acre-feet of Yellowstone River at Huntley (12,000 square miles), 1908 to 1917: Maximum, 7,391,600; minimum, 4,562,200; mean, 6,092,400.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1918: 31,607 acres.

Area under water-right applications season of 1918: 27,365 acres.

Length of irrigating season: May 1 to September 30—153 days.

Average elevation of irrigable area: 3,000 feet above sea level.

Rainfall on irrigable area: 10 years, average 13.68 inches; 1917, 11.61 inches.

Range of temperature on irrigable area: $-35°$ to 105° F.

Character of soil of irrigable area: Ranges from heavy clay to light sandy loam.

Principal products: Alfalfa, oats, sugar beets, and wheat.

Principal markets: Billings, Mont; St. Paul and Minneapolis, Minn.; Denver, Colo.; Kansas City, Mo.; Seattle, Wash.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: May 21, 1907; March 3, 1909; March 13, 1912; June 23, August 9, 1913; September 24, November 3, 1914; February 27, March 20, October 9, December 23, 1915; January 15, March 15, 1916; March 20, 1917; April 4, 1918.

Location of lands opened: Tps. 2 and 3 N., Rs. 27 to 31 E., inclusive, Montana meridian.

Limit of area of farm units: 160 acres.

Duty of water: 2½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: First unit, entered before December 23, 1915, public land, $30 per acre, additional charge of $4 per acre payable to Indians, private land, $50 per acre since December 1, 1913, additional charge of $15 per acre for supplemental construction for all water-right applicants subject to the terms of the extension act; and all other water-right applicants who have agreed to the increased charge; public land entered since December 23, 1915, $45 per acre. Second and third units, public land, $60 per acre, additional charge of $4 per acre payable to Indians; private land, $60 per acre.

Annual operation and maintenance charge: For all lands of the project, water delivered between July 8 and August 31, inclusive, $1.10 per acre-foot; and for water delivered prior to July 8 and subsequent to August 31, 50 cents per acre-foot; a minimum charge of $1.50 per irrigable acre, whether water is used or not, which minimum charge is credited to the amount due for water furnished at above rates; water-right applicants in the first unit who failed or refused to sign the contract for payment of the supplemental construction charge are required to pay an additional charge of $1.50 per acre of irrigable land.

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[1] Less than 25 population.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1904.
Construction recommended by board of engineers, February 26, 1905.
Construction authorized by Secretary, April 18, 1905.
First irrigation by Reclamation Service, season 1908.
First unit completed in 1908.
Second unit completed in 1915.
Entire project 89 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Huntley project provides for the diversion of water from the south side of the Yellowstone River about 2 miles above Huntley, Mont., into a main canal which extends down the valley about 27 miles to a point 2 miles east of Bull Mountain, Mont. The greater portion of the water is distributed by gravity. Fourteen miles below the head gates, a 2-unit gravity pumping plant and a 2-unit power pumping plant are installed, and 100 second-feet of water is lifted 45 feet into a high-line canal. The high-line canal serves about 5,400 acres of land above the main canal in the vicinity of Ballantine, Anita, and Pompey's Pillar, Mont. The gravity pumping plant is a reinforced concrete building containing two pumping units, each with a capacity of about 30 second-feet, and each comprising a turbine water wheel directly connected with a centrifugal pump by means of a vertical shaft. Three hundred and ten net horsepower is developed by a 34-foot drop in the main canal. The power pumping plant is a wooden-framed building covered with galvanized iron, having a concrete foundation, containing two pumping units, each with a capacity of about 23 second-feet, and each comprising a 182-horsepower semidiesel engine and a centrifugal pump, belt drive.

During the present season the entire system is being utilized for irrigation purposes.

The United States claims all waste, seepage, unappropriated spring, and percolating waters arising within the project, and proposes to use such waters in connection therewith.

Further operations provide for the construction of drainage canals for the relief and protection of project lands from seepage conditions, the replacing of all remaining timber structures in the first unit with permanent type structures, completing the building for the power pumping plant, and building a few structures on lateral F. G. L.

SUMMARY OF GENERAL DATA FOR HUNTLEY PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:		
Irrigable acreage when project is complete		32,979
Public land entered to end of fiscal year	26,214	
Public land open to entry at end of fiscal year	1,401	
Public land withdrawn at end of fiscal year	1,372	
Private land	3,992	
Acreage service could have supplied season of 1917		31,607
Estimated addition in fiscal year, 1919		1,372
Estimated acreage service can supply July 1, 1919		32,979
Acreage actually irrigated, season of 1917		19,122
Acreage cropped under irrigation, season of 1917		19,105

Crops:	
Value of irrigated crops, season of 1917	$690,830.00
Value of irrigated crops per acre cropped	36.16

Finances:	
Net construction cost to end of fiscal year	$1,705,490.38
Per cent complete at end of fiscal year	89
Appropriated for fiscal year 1919, total	$112,000.00
Allotment for construction, fiscal year 1919	$57,600.00
Estimated per cent complete, June 30, 1919	92
Proposed appropriation, fiscal year 1920, for construction	$83,000.00
Estimated total construction cost to June 30, 1920	$1,829,000.00
Estimated per cent complete, June 30, 1920	96
Announced construction charges per acre	$30, $45, $50, $60
Appropriation, fiscal year 1918	[1] $180,000.00

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[1] Includes refunds authorized to be added to 1918 appropriation by sundry civil act of June 12, 1917.

Finances—Continued.

Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$148,504.85		
Transfers	14,478.57		
		$162,983.42	
Registered liabilities chargeable to 1918 appropriation		16,970.16	
			$179,953.58
Unencumbered balance, July 1, 1918			46.42

Repayments:

Value of construction water-right contracts	1,277,355.55
Construction charges—	
Accrued to end of fiscal year	[1] 289,189.04
Collected to end of fiscal year	[2] 282,882.52
Uncollected at end of fiscal year	[3] 6,306.52
Operation and maintenance charges (public notice)—	
Accrued to end of fiscal year	171,524.39
Collected to end of fiscal year	157,967.12
Uncollected at end of fiscal year	13,557.27
Water-rental charges—	
Accrued to end of fiscal year	1,182.16
Collected to end of fiscal year	1,100.09
Uncollected at end of fiscal year	82.07

Drainage:

Estimated acreage damaged by seepage to end of fiscal year		1,539
Miles of drains built to end of fiscal year—		
Open	16	
Closed	47	
Total		63
Estimated acreage protected by drains built to end of fiscal year.		20,000
Estimated acreage to be protected by authorized system		24,000
Cost of drainage works to end of fiscal year		$476,924.75

CONSTRUCTION DURING FISCAL YEAR.

Construction.—Work was continued on auxiliary lateral F. G. L.; Arrow Creek siphon, Smith Coulee culvert, 1 steel flume, and several timber structures were built. The first 7 miles of the high line canal were enlarged from 60 to 100 second-feet capacity. At the first drop on the main canal, the Ballantine auxiliary pumping plant, including 1,140 linear feet of 42-inch and 75 linear feet of 48-inch continuous wood-stave pipe, was built, and 2 oil engines and pumping machinery were installed.

Supplemental construction.—Construction work was in progress on closed drains Nos. 13–1, 20, 25, and 26, and open drain No. 162. In all 15,291 linear feet of closed drain and 1,093 linear feet of open drain were constructed. On the canal system 9 wooden turnouts, 15 wooden checks, and a wooden sluiceway were replaced with permanent type structures. On the lateral system the following wooden structures were replaced with structures of permanent type: Twenty-four farm turnouts, 3 division boxes, 24 checks, 1 drop, 3 flumes, 1 culvert, and 1 wasteway.

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[1] Includes $1,936.60 accrued supplemental construction charges to be collected as operation and maintenance.

[2] Includes $1,124.54 supplemental construction collected as operation and maintenance.

[3] Includes $812.06 operation and maintenance supplemental construction charges uncollected.

During the fiscal year 57,640 cubic yards of class 1 excavation were moved and 1,077 cubic yards of reinforced concrete were placed.

All of the above work with the exception of the 42-inch continuous wood-stave pipe was performed with United States forces.

SEEPAGE AND DRAINAGE.

For the calendar year 1917 operation and maintenance and construction payments were suspended on 1,539.26 acres of land that were seeped or had not been fully reclaimed from the effects of seepage. There were no marked changes in seepage conditions during the fiscal year.

OPERATION AND MAINTENANCE.

The operation season of 1917 opened May 18 and closed September 17.

The precipitation during May and up to June 10 was above normal, and there was requirement for very little irrigation water. After June 10 the weather was very hot and dry, and during the remainder of the season there was a heavy irrigation requirement. Two bad breaks in the main canal occurred in July at a point about one-half mile east of Sand Creek.

In 1918, May weather was favorable for crops and little irrigation water was used. June weather was abnormal, being very hot and dry, causing a heavy demand for irrigation water.

Maintenance work consisted of repairs made to canals and structures, mowing of weeds, cleaning sediment from canals, replacing timber structures with permanent ones, construction of 300 linear feet of canal lining and 368 linear feet of steel flume in the main canal, and maintaining constructed closed drains.

Historical review, Huntley project.

Item.	1913	1914	1915	1916	1917	1918[1]
Acreage for which service was prepared to deliver water	28,805	28,805	30,826	32,271	32,271	31,607
Acreage irrigated	15,798	17,068	18,203	18,635	19,122	19,000
Miles of canal operated	194	194	210	210	229	229
Water diverted (acre-feet)	54,702	55,543	52,383	67,878	64,344	65,000
Water delivered to land (acre-feet)	24,118	24,429	17,634	21,128	21,274	22,000
Per acre of land irrigated (acre-feet)	1.53	1.43	0.97	1.13	1.11	1.16

[1] Estimated.

SETTLEMENT.

During the fiscal year there were two new filings. Two farms changed hands by relinquishment, and three farms changed hands by assignment and transfer.

Settlement data, Huntley project.

Item.	1913	1914	1915	1916	1917	1918
Total number of farms on project	585	586	646	691	691	691
Population	1,659	1,700	1,754	2,050	1,880	2,107
Number of irrigated farms	527	535	530	550	553	561
Operated by owners or managers	....	432	383	400	368	359
Operated by tenants	....	103	147	150	185	202
Population	1,659	1,709	1,754	2,050	1,880	2,107
Number of towns	8	8	8	8	8	8
Population	350	475	475	468	610	599
Total population in towns and on farms	2,009	2,175	2,229	2,518	2,490	2,706
Number of public schools	13	14	15	8	8	8
Number of churches	5	6	6	6	6	6
Number of banks	2	3	3	3	4	4
Total capital stock	$40,000	$60,000	$60,000	$60,000	$85,000	$85,000
Amount of deposits	....	$220,000	$239,000	$307,414	$498,000	$540,434
Number of depositors	....	886	1,060	1,180	1,375	1,400
Number of relinquishments	16	4	2	5	5	2

PRINCIPAL CROPS.

The principal crops in 1917 were sugar beets, alfalfa, wheat, and oats in the order named. These crops represented 90 per cent of the total cropped area and returned 94 per cent of the total estimated crop value for the season. Hailstorms occurring on June 11 and July 4 did considerable damage to growing crops in the vicinity of Anita, Ballantine, and Worden, Mont.

Crops on June 30, 1918, were in excellent condition, with the exception of those damaged by high water in the Yellowstone River and by insufficient water supply under the pumping system. There are, approximately, 19,000 acres of land under irrigation this year:

Crop report, Huntley project, Montana, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	6,002	Ton	14,062	2.34	$14.70	$206,840	$34.46
Alfalfa seed	13	Bushel	56	4.39	14.63	820	64.27
Apples	2	...do	40	20	1.00	40	20.00
Barley	109	...do	1,304	12	1.20	1,570	14.42
Beans	129	...do	376	2.93	6.19	2,330	18.12
Beets, sugar	3,366	Ton	28,553	8.48	7.27	207,560	61.66
Cane	16	...do	105	7	10.24	1,075	71.66
Clover hay	79	...do	103	1.31	17.92	1,846	23.51
Clover seed	120	Bushel	508	4.22	9.62	4,890	40.58
Corn, Indian	186	...do	3,497	18.78	1.46	5,100	27.39
Sorghum	6	Ton	18	3	10.00	180	30.00
Corn fodder	66	...do	106	1.6	11.08	1,180	17.74
Flax	11	Bushel	5	.45	2.00	10	.91
Garden	200	....	....	....	....	12,720	63.70
Hay, except above	397	Ton	401	1.01	17.23	6,921	17.42
Oats	2,420	Bushel	70,470	29.11	.78	54,915	22.69
Pasture	1,450	....	....	....	....	9,237	6.36
Potatoes	164	Bushel	21,272	13	.77	16,300	99.65
Wheat[1]	4,330	...do	83,450	19.25	1.88	156,838	36.22
Sweet clover	21	Ton	14	.65	7.00	98	4.55
Cucumbers	3	....	....	....	....	77	25.67
Miscellaneous	15	....	....	....	....	283	....
Total cropped acreage.	19,105	Total and average			....	690,830	36.16

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Total irrigable area farms reported	27,374.1	601	83
Nonbearing orchards	17	Total irrigated area farms reported	19,121.65	561	58
		Under water-right applications	18,874.6	583	57.3
Total irrigated acreage	19,122	Under rental contracts	229.8	8	.6
		Total cropped area farms reported	19,104.4	501	57.9

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[1] Wheat was grown on 975 acres additional without irrigation, yielding 12,000 bushels, valued at $23,000.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, APRIL 4, 1918.

1. **Annual operation and maintenance charges.**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charges for the irrigation season of 1918 and thereafter until further notice against all lands of the Huntley project, Montana, under public notice, shall be as follows: (*a*) For water delivered between July 8 and August 31, inclusive, $1.10 per acre-foot; and (*b*) for water delivered prior to July 8 and subsequent to August 31, 50 cents per acre-foot: *Provided*, That there shall be a minimum charge of $1.50 per irrigable acre for all lands, whether water is used thereon or not, payment under this charge to be credited on the water user's account under the above acre-foot rates. All operation and maintenance charges are due and payable on March 1 following the irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15, or where water-right application is made after August 1 for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which water-right application is made.

E. C. BRADLEY,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Huntley project, June 30, 1918.

Cash		$900.40
Inventory of stock on hand		44,529.17
Accounts receivable		1,010,194.88
Construction cost	$1,718,480.53	
Less construction revenue earnings	12,990.15	
		1,705,490.38
Operation and maintenance cost	281,383.87	
Less operation and maintenance revenue earnings	6,874.04	
		274,509.83
Total		3,035,624.66
Accounts payable		19,007.48
Contingent obligations		900.40
Reserves for repayment to reclamation fund of cost of projects		1,460,233.31
Miscellaneous accruals		49,304.17
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	$2,213,288.00	
Collection, transfer, refund, and joint construction vouchers issued	707,108.70	
Net investment		1,506,179.30
Total		3,035,624.66

Feature costs of Huntley project, June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30,1918.
Examinations and surveys	$1,704.72	$10,901.06
Pumping for irrigation:		
Gravity pumping plant		2,311.02
Ballantine auxiliary pumping plant	49,328.58	49,328.58
	49,328.58	51,639.60
Canal system	19,961.20	711,329.76
Lateral system	15,393.94	398,175.28
Drainage system	18,861.24	476,924.75
Flood protection		3,731.03
Farm units—experiment station		1,751.99
Permanent improvements		18,336.13
Telephone system		9,112.34
Balance in plant accounts	14,608.80	29,185.41
Operation and maintenance charges transferred to and compounded with construction charges	[1] 158.20	1,614.41
Unadjusted clearing accounts	5,778.77	5,778.77
Gross construction cost to June 30, 1918	125,479.05	1,718,480.53
Less revenues earned during construction period:		
Rental of buildings		315.00
Rental of grazing and farming lands		1,100.69
Rentals of telephones and tolls		406.79
Contractor's freight refunds		7,633.45
Other revenues, unclassified		212.00
Profit on hospital operations	506.16	3,322.22
	506.16	12,990.15
Net cost of construction of project to June 30, 1918		1,705,490.38

[1] Deduct.

Cost statement, by calendar years, Huntley project.

Year ending Dec. 31—	Construction.	Operation and maintenance under public notice.	Total cost.
1904	$2,393.91		$2,393.91
1905	52,273.57		52,273.57
1906	353,388.54		353,388.54
1907	403,341.52		403,341.52
1908	35,304.16	$13,062.17	48,366.33
1909	22,502.28	29,005.64	51,507.92
1910	18,889.90	23,831.19	42,721.09
1911	24,046.58	32,299.71	56,346.29
1912	125,979.24	29,838.83	155,818.07
1913	123,023.60	25,125.92	148,149.52
1914	138,078.35	28,734.61	166,812.96
1915	135,370.33	21,582.49	156,952.82
1916	114,772.14	25,792.11	140,564.25
1917	107,428.90	32,053.42	139,482.32
January to June 30, 1918	55,908.74	20,057.78	75,966.52
Unadjusted clearing accounts to June 30, 1918	5,778.77		5,778.77
Total	1,718,480.53	281,383.87	1,999,864.40

Cost statement, by fiscal years, Huntley project.

Year ending June 30—	Construction.	Operation and maintenance under public notice.	Total cost.
1905 [1]	$30,272.90		$30,272.90
1906	92,908.30		92,908.30
1907	486,052.11		486,052.11
1908	202,084.40	$4,397.57	206,481.97
1909	53,393.50	20,381.13	73,774.63
1910	24,650.36	18,244.69	42,895.05
1911	10,028.37	36,674.72	46,703.09
1912	87,337.62	31,821.77	119,159.39
1913	86,614.76	25,412.83	112,027.59
1914	132,166.57	30,233.07	162,399.64
1915	122,995.27	26,057.05	149,052.32
1916	163,689.06	28,802.56	192,491.62
1917	100,808.26	22,086.10	122,894.36
1918	125,479.05	38,886.79	164,365.84
Unpaid operation and maintenance added to construction		[2] 1,614.41	[2] 1,614.41
Total	1,718,480.53	281,383.87	1,999,864.40

[1] Year ending Sept. 30.

[2] Deduct.

Estimated cost of contemplated work, Huntley project, during fiscal year 1919.

Features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Pumping for irrigation—Ballantine auxiliary pumping plant		$7,000
Canal system:		
Checks	$3,000	
Minor structures	1,400	
		4,400
Lateral system—Minor structures		16,750
Drainage system—Closed drains	23,000	23,000
Farm units—Farming operations		3,400
Operation and maintenance under public notice:		
Operation	5,000	
Maintenance	27,000	
		32,000
Reimbursible accounts		250
Plant and equipment		2,800
Total		89,600

Operating costs and revenues, Huntley project, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Pumping for irrigation		$1,472.79	$1,472.79	$1,414.72	$6,392.81	$7,807.53
Lateral system:						
First unit	$4,212.86	18,361.42	22,574.28	46,991.92	194,792.61	241,784.53
Second unit	592.56	7,080.12	7,672.68	1,657.83	11,057.64	12,715.47
Third unit	574.46	1,638.57	2,213.03	815.86	3,780.97	4,596.83
	5,379.88	27,080.11	32,459.99	49,465.61	209,631.22	259,096.83
Maintenance, permanent improvements: All units		1,558.47	1,558.47		3,543.66	3,543.66
Drainage system		3,395.54	3,395.54	78.24	12,472.62	12,550.26
Total cost	5,379.88	33,506.91	38,886.79	50,958.57	232,039.71	282,998.28
Less unpaid operation and maintenance charges added to construction						[1] 1,614.41
Net cost						281,383.87

[1] Deduct.

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$22,514.25	$171,524.39
Operation and maintenance charges paid in advance by water-right applicants	560.23	821.53
Operation and maintenance charges paid and forfeited by water-right applicants	2,064.79	3,014.58
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	574.64	1,362.93
Rental of buildings during operating period	850.50	5,467.69
Rentals of irrigation water	734.67	1,182.16
Rental of telephone and tolls during operating period		2.35
Other revenues, unclassified, earned during operating period	45.55	221.84
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants	[1] 724.97	[1] 1,886.10
Total	26,619.66	181,711.37
Deficit	12,267.13	99,672.50

[1] Deduct.

MONTANA, MILK RIVER PROJECT.

G. E. **Stratton**, project manager, Malta, Mont.
R. M. **Snell**, project manager, St. Mary storage unit, Browning, Mont.

LOCATION.

Counties: Teton, Hill, Blaine, Phillips, and Valley.

Townships: 34 to 37 N., R. 14 W.; 34 N., R. 15 W.; 37 N., Rs. 11 to 13 W.; 33 to 37 N., Rs. 10 to 13 E.; 27 to 33 N., Rs. 17 to 42 E., Montana meridian.

Railroads: Great Northern and Canadian Pacific.

Railroad stations and estimated population June 30, 1918: Browning, 600; Havre, 6,000; Chinook, 1,500; Zurich, 50; Harlem, 700; Savoy, 80; Coburg, 80; Dodson, 400; Wagner, 50; Malta, 1,500; Bowdoin, 400; Saco, 500; Beaverton, 50; Hinsdale, 400; Glasgow, 2,500; and Nashua, Mont., 400; Cardston and Woolford, Canada.

WATER SUPPLY.

Source of water supply: St. Mary Lakes, Swiftcurrent Creek, and Milk River.

Area of drainage basin: St. Mary Lakes and Swiftcurrent Creek, 298 square miles; Milk River at Havre, 5,550 square miles; Milk River at Malta, 11,850 square miles; Milk River at Hinsdale, 20,150 square miles.

Annual run-off in acre-feet of St. Mary River (including Swiftcurrent Creek): At Babb (298 square miles), 1902–1917—maximum, 830,000; minimum, 459,200; mean, 562,200. At international line (452 square miles), 1903–1917—maximum, 1,107,300; minimum, 514,100; mean, 721,000. Of Milk River: At Havre (5,550 square miles), 1898–1917—maximum, 426,000; minimum, 17,100; mean, 196,500. At Malta (11,850 square miles), 1903–1917—maximum, 712,800; minimum, 29,400; mean, 321,800. At Hinsdale (20,150 square miles), 1908–1917—maximum, 1,210,000; minimum, 146,500; mean, 489,800.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1918: 61,000 acres.

Area under rental contracts, season 1918 (to June 30): 19,000 acres.

Length of irrigation season: From April 16 to September 30, 170 days.

Average elevation of St. Mary storage: 5,500 feet above sea level.

Average elevation of irrigable area: 2,200 feet above sea level.

Rainfall on St. Mary storage: About 24 inches, average.

Rainfall on irrigable area: At Havre, 38 years, average 13.96 inches; 1917, 13.67 inches; at Malta, 12 years, average 13.56 inches; 1917, 8.73 inches.

Range of temperature on irrigable area, −56° to 105° F.

Character of soil of irrigable area: Sandy loam, clayey loam, and some gumbo.

Principal products: Alfalfa and other fodder crops, grain, and vegetables.

Principal markets: Minneapolis and St. Paul, Minn., Great Falls, Mont., and local.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun by the Reclamation Service in 1902.

Construction conditionally authorized by Secretary March 14, 1903.

Construction of St. Mary storage unit authorized by Secretary March 25, 1905.

Construction begun July 27, 1906.

Dodson diversion dam completed in January, 1910.

Treaty with Great Britain relating to distribution between Canada and the United States of the waters of St. Mary and Milk Rivers signed January 11, 1909, and proclaimed May 13, 1910.

Water delivered for irrigation in 1911.

Recommendations covering construction of the project approved by Secretary June 13, 1912.

Dodson North Canal completed in 1914.

Sherburne Lakes Reservoir begun June 29, 1914.

Vandalia diversion, Vandalia South, and Dodson South Canals completed in 1915.

Nelson Reservoir, first development completed 1915.

Nelson Reservoir South Canal begun 1915.

Bowdoin Canal begun 1915; first unit completed 1917.

First unit of Nelson Reservoir South Canal lateral system completed and water from Nelson Reservoir delivered for irrigation, 1918.

Milk River unit 52 per cent completed June 30, 1918.

St. Mary storage unit 76 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Milk River project provides for the storage of water in the Sherburne Lakes and the St. Mary Lakes, and its diversion through a canal 28.9 miles long, heading three-fourths of a mile below St. Mary Reservoir and discharging into the North Fork of Milk River, thence flowing through Canada for 100 miles or more and returning to the United States; the storage of water in Nelson Reservoir south of Milk River and 14 miles northeast of Malta; the discharge of stored water into Milk River as required; the diversion of water from Milk River by a dam near Chinook into two canals, one on each side of the river, for the irrigation of lands near Chinook and Harlem, comprising the Chinook division; the diversion of water from Milk River by a dam near Dodson into two canals, the northside canal irrigating lands near Dodson, Wagner, and Malta, and the southside canal conveying water to Nelson Reservoir and irrigating lands near Wagner, Malta, Bowdoin, and Ashfield; the irrigation of lands on both sides of Milk River and Beaver Creek in the vicinity of Saco and Hinsdale from the stored waters of Nelson Reservoir, comprising the Malta division; and in the Glasgow division the diversion of water at Vandalia Dam into a canal on the south side of Milk River for the irrigation of lands near Tampico, Glasgow, and Nashua. In case the normal flow of Milk River at Vandalia Dam is not sufficient for the irrigation of lands in the Glasgow division, the stored waters in Nelson Reservoir will be returned to Milk River and diverted again at Vandalia Dam. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan which have been completed are: 28.9 miles of the St. Mary Canal; Vandalia diversion dam, including the automatic movable crest gates and Dodson diversion dam, to the height of the fixed crest; headworks for the Dodson North, Dodson South, and Vandalia South Canals; 10 miles of the Dodson South Canal, with a capacity of 900 second-feet, including Point of Rocks equalizing reservoir, 34 miles, with a capacity of 500 second-feet, and the lateral and waste-water systems to cover 15,000 acres; 28 miles of Dodson North Canal, with a capacity of 200 second-feet at its head, including the lateral and waste-water systems for 12,000 acres; 46 miles of Vandalia South Canal, with a capacity of 300 second-feet at its head, including the lateral and waste-water systems for 19,300 acres; 18 miles of Bowdoin Canal, with a capacity of 175 second-feet at its head, including lateral and waste-water systems for 8,000 acres; Nelson Reservoir South Main Canal with a capacity of 250 second-feet at its head; the first development of Nelson Reservoir to store 25,000 acre-feet; and the first unit of the Nelson Reservoir South Canal lateral system to cover 10,000 acres.

The work under construction consists of the replacing of the old timber crib north abutment of Dodson Dam with a reinforced concrete abutment; the installation of permanent movable crest gates, service bridge, and hoisting devices on this dam; work on lateral systems under the Nelson Reservoir South Canal; the building of telephone lines from Nelson Reservoir to Beaverton and from near Paisley to Willow Creek below Glasgow; Sherburne Lakes Reservoir Dam; and an operation road along the St. Mary Canal.

The principal features remaining to be completed are: Chinook Division, comprising the diversion dam and the North and South Canals; Nelson Reservoir to its final development; Beaver Creek Reservoir and canals; Nelson Reservoir North Canal; second units of the Bowdoin and Nelson Reservoir South Canal lateral systems; St. Mary Lake and Sherburne Reservoirs; the second pipe line across St. Mary River and Halls Coulee Crossing; and the second barrel of the steel flume across Spider Lake Coulee.

SUMMARY OF GENERAL DATA FOR MILK RIVER PROJECT, TO END OF FISCAL YEAR, 1918.

[Exclusive of St. Mary storage unit.]

Areas:

Irrigable acreage when project is complete		200,000
Public land entered to end of fiscal year	42,508	
Public land withdrawn at end of fiscal year	24,346	
State land	8,348	
Indian land	28,000	
Private land	96,798	
Acreage service could have supplied season of 1917		45,000
Addition in fiscal year, 1918		16,000
Estimated addition in fiscal year, 1919		4,000
Estimated acreage service can supply July 1, 1919		65,000
Acreage actually irrigated, season of 1917		11,058
Acreage cropped under irrigation, season of 1917		10,893
Acreage cropped by dry farming, season of 1917		8,780

Crops:

Value of irrigated crops, season of 1917	$208,335.00
Value of irrigated crops, per acre cropped	$19.13
Value of crops dry farmed, season of 1917	$47,548.00
Value of crops dry farmed, per acre cropped	$5.42

Finances:

Net construction cost to end of fiscal year			$3,173,978.69
Per cent complete at end of fiscal year			52
Appropriated for fiscal year 1919, total			$112,000.00
Allotment for construction, fiscal year 1919			$110,300.00
Estimated per cent complete, June 30, 1919			53
Proposed appropriation, fiscal year 1920, for construction			$118,700.00
Estimated total construction cost to June 30, 1920			$3,455,000.00
Estimated per cent complete, June 30, 1920			58
Appropriation, fiscal year 1918		[1] $160,000	
Increase under 10 per cent provision of act		16,000	
Total appropriation			$176,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$133,861.49		
Transfers	12,949.21		
		$146,810.70	
Registered liabilities chargeable to 1918 appropriation		14,291.67	
Contract obligations wholly covered by 1918 appropriation		3,000.00	
Estimated engineering expenses on contract work wholly covered by 1918 appropriation		3,750.00	
			167,852.37
Unencumbered balance, July 1, 1918			8,147.63

Drainage:

Estimated acreage damaged by seepage to end of fiscal year	500

ST. MARY STORAGE UNIT.[2]

Finances:

Net construction cost to end of fiscal year 1918	$2,417,913.03
Per cent complete at end of fiscal year	76
Appropriated for fiscal year 1919, total	$74,000.00
Allotment for construction, fiscal year 1919	$71,500.00
Estimated per cent complete, June 30, 1919	80

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[1] Includes refunds authorized to be added to 1918 appropriation by sundry civil act of June 12, 1917.

[2] The St. Mary storage unit is to supply water for Milk River project. Data on areas and crops shown on report for Milk River project.

Finances—Continued.

Proposed appropriation, fiscal year 1920, for construction			$98,000.00
Estimated total construction cost to June 30, 1920			$2,616,000.00
Estimated per cent complete, June 30, 1920			82
Appropriation, fiscal year 1918			[1] $183,500.00
Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$161,732.56		
Transfers	10,430.36		
		$172,162.92	
Registered liabilities chargeable to 1918 appropriation		11,245.51	
			183,408.43
Unencumbered balance, July 1, 1918			91.57

CONSTRUCTION DURING FISCAL YEAR.

MILK RIVER PROJECT DISTRIBUTION UNITS.

Chinook division.—No work was in progress in this division.

Malta division.—At Dodson diversion dam the old timber crib north abutment was replaced by a reinforced-concrete structure, and the timbers on the roller way of the dam, which had become much abraded, were replaced by new timbers. Material was purchased and delivered for the permanent movable crest gates, service bridge, and hoisting devices.

On Dodson North and South Canals the wasteway at Cow Creek (mile 6DSC) was completed except for back filling and placing of gates. Several wooden flumes were replaced by steel flumes, and one wooden flume was replaced by a concrete culvert. Extensions were made to the lateral systems to cover additional lands taken in, and in three places laterals in danger of sloughing off into the Milk River were rebuilt in new locations.

On Bowdoin Canal system several additional checks and turnouts were placed.

On Nelson Reservoir South Canal lateral system earthwork and building of structures by contract were in progress through the working season of the fiscal year.

Glasgow division.—At Vandalia diversion dam the installation of the automatic movable crest with service bridge and hoisting mechanism was completed in October, 1917. A small amount of paving was done by Government forces below the dam.

On Vandalia South Canal one concrete check and four wooden wasteways were built, as well as several turnouts and other minor structures.

ST. MARY STORAGE UNIT.

St. Mary Canal.—About a mile of operation and maintenance highway was constructed along the canal right of way. Nineteen miles of ground circuit telephone line were constructed along the canal, a two-span wooden bridge built across Kennedy Creek on the operation and maintenance road, and a small amount of slide material moved from the canal section.

Sherburne Lakes dam.—The construction of the dam was continued by Government forces. During the year the work was advanced from 69 to 90 per cent completion. On June 30, 1918, the outlet structure was complete and in operation; the dam was completed to within 18 feet of the crest. Work on the spillway channel has been delayed by an earth slide of about 25 acres in extent, which has developed on the north hillside adjacent to the spillway. The studies and designs rendered necessary by this slide are well under way.

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[1] Includes refunds authorized to be added to 1918 appropriation by sundry civil act of June 12, 1917.

SEEPAGE AND DRAINAGE.

Seepage is showing on some lands adjacent to Nelson Reservoir, on one area under the Dodson South Canal near Strater, and to some extent under the Dodson South Canal in the vicinity of Wagner and Alkali Creek. These areas will probably require drainage at some future time, but no subsurface drains have yet been built. Surface waste-water ditches are constructed to tap practically each farm.

BOARD MEETINGS.

Date.	Subject.	Personnel.
Nov. 7, 1917.	North hillside slide, Sherburne Lakes Dam	D. C. Henny, A. J. Wiley, R. M. Snell, L. V. Branch.
Apr. 14, 1918.	.....do	D. C. Henny, Chas. P. Williams, L. V. Branch.

OPERATION AND MAINTENANCE.

During 1917 the Dodson North, Dodson South, Bowdoin, and Vandalia South Canals were operated and water delivered on a water-rental basis. In the fall of 1917 the Nelson Reservoir South Canal was put into operation for a few weeks for the purpose of puddling and priming.

During 1918 all of the above-named canals were operated for delivering water on the water-rental basis. Up to about June 8 the natural water supply of the Milk River in the season of 1918 was sufficient to meet all demands, but during the balance of June there was a shortage of water at Dodson Dam, although a supplemental water supply from St. Mary storage was turned on May 30, delivering a maximum head of 364 second-feet. Two hundred and nine applications were received for water, covering an area of 18,500 acres.

St. Mary Canal.—During the 1917 irrigation season the St. Mary Canal was operated constantly from July 1 to September 15, delivering 38,188 acre-feet to Milk River, the maximum head delivered being about 290 second-feet. After the end of the season a maintenance crew filled in several slides, raised the bank in several places, puddled porous places in the canal section, and removed a small amount of slide material from the canal section. During the spring of 1918, before water was turned into the canal, a maintenance crew did a small amount of repair work on operation and maintenance road, and moved a small amount of slide material from the canal section.

Historical review, Milk River project.

Item.	1913	1914	1915	1916	1917	1918[1]
Acreage for which service was prepared to supply water	12,800	13,440	40,000	40,400	45,000	61,000
Acreage irrigated	2,545	2,201	4,192	5,518	11,058	14,000
Number of farms irrigated	41	36	48	64	112	200
Miles of canal operated	59	58	86	184	204	275
Water diverted (acre-feet)	4,863	4,229	13,041	[2] 61,534	68,503	70,000
Water delivered to land (acre-feet)	2,349	1,760	2,884	3,700	11,195	15,000
Per acre of land irrigated (acre-feet)	0.92	0.80	0.69	0.67	1.01	1.07

[1] Estimated.

[2] 33,040 acre-feet of water diverted delivered for storage in Nelson Reservoir.

SETTLEMENT.

The project has not been formally opened and little progress has been made in settlement. There are several large holdings of land, and some attempt was made by several of these landowners during the past year to lease these lands with option for sale at the termination of the lease.

Three Government townsites have been opened on the project, one at Vandalia on July 1, 1916, where no lots were sold; one at Zurich on June 23, 1917, when 42 lots were sold, which was also the number sold up to June 30, 1918; one at Bowdoin on December 1 and 3, 1917, where 132 lots were sold on the days of sale and 159 lots to June 30, 1918.

Settlement data of irrigated district, Milk River project.

Item.	1914	1915	1916	1917	1918
Total number of farms on project	60	101	155	192	[1] 260
Population	130	210	430	580	[1] 700
Number of irrigated farms	37	48	64	112	[1] 200
Operated by owners or managers	25	29	37	77	[1] 160
Operated by tenants	12	19	27	35	[1] 40
Population	120	140	193	404	[1] 600
Number of towns	3	3	5	6	9
Population	1,105	1,460	4,500	5,000	[1] 6,000
Total population in towns and on farms	1,235	1,670	4,930	5,580	[1] 6,700
Number of public schools	5	6	14	14	18
Number of churches	6	6	14	15	18
Number of banks	3	3	7	10	15
Total capital stock	$95,000	$95,000	$252,000	$375,000	$525,000
Amount of deposits	$530,000	$600,000	$1,959,000	$3,238,000	$3,219,000
Number of depositors	1,400	1,800	6,615	9,156	11,640

[1] Estimated.

PRINCIPAL CROPS.

Grain occupied 22 per cent, forage crops 72 per cent, and miscellaneous crops 6 per cent of the cropped area in 1917.

Irrigated crop report, Milk River project, Montana, year of 1917.

Irrigated crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	2,067	Ton	3,313	1.6	$19.00	$62,947	$30.45
Alfalfa seed	2	Bushel	16	8.0	15.00	240	120.00
Barley	108	...do	602	5.6	1.00	602	5.57
Beans	23	...do	150	6.5	8.60	1,290	56.09
Corn	10	...do	180	18.0	1.00	180	18.00
Flax	534	...do	1,915	3.6	2.97	5,688	10.63
Garden	31					3,430	110.65
Hay, except above	5,605	Ton	3,289	.6	25.00	82,225	14.67
Oats	682	Bushel	11,503	16.9	.80	9,202	13.49
Pasture	66					465	7.05
Potatoes	87	Bushel	7,562	87	1.80	13,612	156.46
Wheat	2,310	...do	14,805	6.4	1.90	28,129	12.17
Miscellaneous	26					325	12.50
Less duplicated areas	658						
Total acreage cropped by irrigation.	10,893	Total and average				208,335	19.13

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Irrigable area farms reported	35,000	192	17.5
New alfalfa, no crop	165	Irrigated area farms reported	11,058	112	5.5
Total other purposes	165	Under rental contracts	11,058	112	5.5
Total irrigated	11,058	Cropped area farms reported:			
		Irrigated	10,893	112	5.4
		Dry land	8,780	50	4.4

Farms partly irrigated, 112; farms dry farmed, 50; farms not cropped, 30.

Dry-farmed crop report, Milk River project, Montana, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	532	Ton	297	0.6	$19.00	$5,643	$10.61
Alfalfa seed	20	Bushel	16	.8	15.00	240	12.00
Barley	238	...do	130	.5	1.00	130	.51
Beans	52	...do	6	.1	8.60	52	1.00
Corn	86	...do	270	3.1	1.00	270	3.14
Flax	673	...do	96	.1	2.97	285	.42
Garden	17					875	51.47
Hay [1]	3,170	Ton	908	.3	25.00	22,700	7.16
Oats	1,100	Bushel	2,300	2.1	.80	1,840	1.67
Potatoes	36	...do	1,668	46	1.80	3,002	83.40
Wheat	3,718	...do	6,568	1.8	1.90	12,479	3.36
Miscellaneous	43					32	.74
Less duplicated areas	905						
Total acreage cropped by dry farming.	8,780	Total and average				47,548	5.42

Areas.	Acres.	Farms.	Per cent of project.
Irrigable area farms reported	35,000	159	17.5
Irrigated area farms reported	11,058	112	5.5
Under rental contracts	11,058	112	5.5
Cropped area farms reported:			
Irrigated	10,893	112	5.4
Dry land	8,780	50	4.4

[1] Other than alfalfa.

Farms partly irrigated, 112; farms dry farmed, 50; farms no crop, 30.

FINANCIAL STATEMENT.

Project balance sheet, Milk River project (exclusive of St. Mary storage unit), June 30, 1918.

Cash			$3,706.22
Inventory of stock on hand			32,296.98
Accounts receivable			5,741.91
Construction work contracted			12,860.72
Construction cost		$3,226,209.11	
Less construction revenue earnings	$51,522.16		
Less cost adjustments	708.26		
		52,230.42	
			3,173,978.69
Total			3,228,584.52
Accounts payable			27,960.40
Contingent obligations			16,566.95
Reserves for repayment to reclamation fund of cost of project			15,531.41
Capital investment:			
Disbursement, transfer, and joint-construction vouchers received		$3,279,601.71	
Collection, transfer, refund, and joint-construction vouchers issued		111,075.95	
Net investment			3,168,525.76
Total			3,228,584.52

Feature costs of Milk River project, Montana (exclusive of St. Mary storage unit).

Principal features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys:		
Chinook division	$4,597.41	$50,970.20
Malta division	4,492.93	49,811.76
Glasgow division	1,358.33	15,059.33
	10,448.67	115,841.29
Storage system (Nelson Reservoir)	3,656.97	54,178.90
Canal system:		
Ashfield Canal	[1]101.21	
Bowdoin Canal	586.41	62,696.75
Chinook Canal	20.98	4,380.66
Chinook diversion (from Milk River)		699.76
Dodson diversion (from Milk River)	74,755.11	315,576.35
Dodson North Canal	17.72	208,574.06
Dodson South Canal	5,605.94	682,317.89
Nelson Reservoir South Canal	6,674.95	123,536.19
Vandalia diversion (from Milk River)	9,767.50	442,579.86
Vandalia South Canal	2,611.37	406,676.74
	99,938.77	2,247,038.26
Lateral system:		
Bowdoin laterals	985.65	62,069.16
Dodson North laterals	442.38	113,216.16
Dodson South laterals	3,966.63	136,084.99
Nelson Reservoir South laterals	87,724.67	202,822.62
Vandalia South laterals	80.34	112,672.09
	93,199.67	626,865.02
Drainage system:		
Dodson South system	140.53	140.53
Nelson Reservoir South	9.40	9.40
	149.93	149.93
Flood protection:		
Dodson South system		34,074.98
Vandalia South system		1,432.85
		35,507.83
Farm units:		
Bowdoin	6.75	941.45
Dodson North		3,756.73
Dodson South		8,664.48
Nelson Reservoir South	128.04	719.13
Vandalia South		1,679.62
	134.79	15,761.41

[1] Deduct.

Feature costs of Milk River project, Montana (exclusive of St. Mary storage unit)—Con.

Principal features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Permanent improvements:		
Wagner operation and maintenance camp		$4,293.23
Dodson Dam	$152.14	152.14
Paisley camp, operation and maintenance	152.47	1,343.77
Malta project headquarters, buildings and grounds	24.97	14,131.59
Nelson Reservoir South		17.25
	329.58	19,937.98
Telephone system	427.46	5,369.32
Operation and maintenance during construction (water rental)	25,563.73	86,861.68
Plant accounts	6,504.15	16,504.65
Undistributed clearing accounts	[1]2,077.45	2,192.84
Gross construction cost to June 30, 1918	238,276.27	3,226,209.11
Less revenues earned during construction period:		
Rental of buildings	522.60	2,510.23
Rental of grazing and farming lands	1,355.41	4,311.62
Rental of irrigation water	6,039.99	24,608.16
Contractors' freight refunds	536.00	19,408.71
Other revenues, unclassified	27.79	683.44
Profit on hospital operations	270.88	708.26
	8,752.67	52,230.42
Net cost of construction of project (exclusive of St. Mary storage unit) to June 30, 1918		3,173,978.69

[1] Deduct.

Cost statement by calendar years, Milk River project (exclusive of St. Mary storage unit).

Year ending Dec. 31—	Construction.	Operation and maintenance during construction.	Total cost.
1907	$86,882.22		$86,882.22
1908	105,749.06		105,749.06
1909	222,954.92		222,954.92
1910	153,767.51		153,767.51
1911	66,913.43	$6,379.82	73,293.25
1912	162,820.25	16,957.99	179,778.24
1913	761,123.58	13,449.85	774,573.43
1914	671,222.04	4,369.62	675,591.66
1915	332,483.85	5,789.97	338,273.82
1916	245,157.83	9,278.53	254,436.36
1917	217,036.13	15,337.13	232,373.26
January to June 30, 1918	94,539.12	15,298.77	109,837.89
Plant and clearing accounts on June 30, 1918	18,697.49		18,697.49
Total	3,139,347.43	86,861.68	3,226,209.11

Cost statement by fiscal years, Milk River project (exclusive of St. Mary storage unit).

Year ending June 30—	Construction.	Operation and maintenance during construction.	Total cost.
1908	$92,919.05		$92,919.05
1909	193,342.45		193,342.45
1910	216,605.81		216,605.81
1911	91,413.95	$2,723.61	94,137.56
1912	62,418.44	13,202.49	75,620.93
1913	444,475.39	19,720.21	464,195.60
1914	713.312.38	3,147.58	716,459.96
1915	616,628.95	4,541.08	621,170.03
1916	241,813.93	7,680.24	249,494.17
1917	239,433.75	10,282.74	249,716.49
1918	212,712.54	25,563.73	238,276.27
Plant and clearing accounts to June 30, 1917	14,270.79		14,270.79
Total	3,139,347.43	86,861.68	3,226,209.11

Estimated cost of contemplated work, Milk River project (exclusive of St. Mary storage unit), during fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys:		
Cooperative stream gauging by U. S. G. S.	$7,000	
Experimental investigations	150	
Examination of land in connection with withdrawals and restorations	200	
		$7,350
Storage system:		
Surveys and investigations in connection with Beaver Creek Reservoir	1,000	
Surveys and investigations in connection with seepage from Nelson Reservoir	500	
		1,500
Canal system:		
Completion of construction at Dodson Dam	14,940	
Completion of Vandalia diversion dam	7,885	
Completion of Cow Creek wasteway, Dodson South Canal	1,200	
Completion of Nelson Reservoir South Canal	3,420	
Structures on Vandalia South Canal	685	
Survey of Chinook North and South Canals	500	
		28,630
Lateral system:		
Extra checks and turnouts	3,000	
Concrete siphon on NS-25 lateral	2,000	
Waste-water ditches on Beaver Creek flats, Nelson Reservoir, South Canal, near Ashfield	5,000	
Additional laterals to water new subscribed lands	1,500	
Additional lateral system to new lands	11,500	
		23,000
Drainage system: Surveys of seeped areas	....	1,000
Flood protection: Construction of cut-off at Rocky Point, mile 8, Dodson South Canal	....	3,000
Farm units: Surveys	....	2,100
Permanent improvements:		
Buildings and sewer and water connections, Malta headquarters	1,300	
Operation and maintenance, headquarters at Saco	4,650	
Wagon shed at Paisley	200	
		6,150
Operation and maintenance during construction (water-rental basis)	....	24,170
Total	....	96,900

Project balance sheet, St. Mary storage unit, June 30, 1918.

Inventory of stock on hand		$67,612.03
Accounts receivable		4,308.53
Construction cost	$2,446,626.19	
Less construction revenue earnings	28,713.16	
		2,417,913.03
Total		2,489,833.59
Accounts payable		21,331.13
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	2,589,268.40	
Collection, transfer, refund, and joint construction vouchers issued	120,765.94	
Net investment		2,468,502.46
Total		2,489,833.59

Feature costs of St. Mary storage unit to June 30, 1918.

Principal features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys	$1,699.43	$50,399.43
Storage system:		
St. Mary Lakes Reservoir; surveying, testing, etc	193.02	38,797.87
Sherburne Lakes Reservoir; surveying, testing, etc	[1] 12,997.55	12,929.52
Sherburne Lakes dam	68,014.49	261,303.50
Sherburne Lakes spillway	100,882.69	222,101.31
Sherburne Lakes outlet	15,033.09	154 827.64
Sherburne Lakes north hillside slide	7,485.01	7,485.01
Sherburne Lakes-Altyn trail	323.95	323.95
	178,934.70	697,768.80
Canal system:		
Preliminary and general work	1,310.09	133,729.25
St. Mary Canal	12,642.95	741,247.86
Kennedy Creek crossing	[1] 646.04	30,146.47
Kennedy Creek temporary headworks	[1] 1,107.74	....
Coal mine (abandoned)	[1] 3,374.02	....
Temporary bridge, St. Mary River crossing	[1] 684.82	....
Diversion dam and headworks	385.51	51,933.04
Diversion dam, Swiftcurrent	1,564.42	84,849.65
Bridges, highway across main canal	109.03	9,915.59
Control check gate, stations 615-20	366.59	12,885.77
Control check gate, station 91	223.33	8,090.09
Drops	2,341.69	85,880.66
Kennedy Creek control check and sluice gates	192.71	13,735.64
Wasteway sluice gate, station 884	276.12	11,100.45
Culvert, Powell Creek crossing	84.52	7,589.89
Culverts, east of Cow Creek	581.31	16,443.85
Culverts, Cow Creek	30.68	5,183.38
Spider Lake, coulee flume	312.55	36,623.20
Siphon, St. Mary river crossing	1,567.42	115,404.68
Siphon, Halls coulee crossing	892.77	46,047.76
Road along St. Mary Canal	2,194.30	3,078.49
Kennedy Creek Bridge	1,935.78	1,935.78
Administrative general expense	[1] 11,047.69	....
	10,151.46	1,415,821.50
Flood protection:		
Kennedy Creek dikes	92.33	18,560.11
Earth dikes, stations 372 and 380	6.09	1,225.79
	98.42	19,785.90
Permanent improvements:		
Road, Browning to St. Mary, camp 9	228.32	45,893.87
Road, Babb to Cardston, Canada	27.78	5,585.12
Road, Babb to Canadian boundary	5.67	1,140.92
Road, Babb to Glacier Park boundary	230.19	46,268.55
Road, St. Mary Chalet to Babb	8.34	1,676.45
Office building, camp 9	6.83	1,373.65
Cottages (four), camp 9	19.77	3,974.10
Water system, camp 9	26.61	5,349.37
Graveling Swift Current Canyon Road	58.30	11,718.81
Steel bridge, St. Mary River crossing	171.71	34,515.42
Steel bridge, camp 2	[1] 1.39	5,722.43
	782.13	163,218.69
Telephone system:		
Completed work	59.15	11,889.90
Line along St. Mary Canal	2,132.16	3,728.11
	2,191.31	15,618.01
Operation and maintenance during construction, water-rental basis	12,833.61	20,250.10
Balance in plant accounts	[1] 7,994.15	56,858.72
Undistributed clearing accounts	3,416.12	6,905.04
Gross construction cost to June 30, 1918	202,113.03	2,446,626.19
Less revenues earned during construction period:		
Rental of buildings	2,327.95	19,659.28
Rentals of telephones and tolls	.75	686.40
Contractors' freight refunds	51.50	6,809.59
Other revenues, unclassified	[1] 2,132.32	18.25
Profit on hospital operations	[1] 108.85	1,203.83
Other profits on operations unclassified	350.17	335.81
	489.20	28,713.16
Net cost of construction of project to June 30, 1918	....	2,417,913.03

[1] Deduct.

Cost statement, by calendar years, St. Mary storage unit.

Year ending Dec. 31—	Construction.	Operation and maintenance during construction.	Total cost.
1908	$197,453.33		$197,453.33
1909	20,578.27		20,578.27
1910	28,833.89		28,833.89
1911	20,652.46		20,652.46
1912	138,141.53		138,141.53
1913	210,408.71		210,408.71
1914	544,384.54		544,384.54
1915	738,564.09		738,564.09
1916	206,227.42	$3,371.75	209,599.17
1917	218,759.02	12,914.11	231,673.13
Jan. to June 30, 1918	38,609.07	3,964.24	42,573.31
Plant and clearing accounts on June 30, 1918	63,763.76		63,763.76
Total	2,426,376.09	20,250.10	2,446,626.19

Cost statement, by fiscal years, St. Mary storage unit.

Year ending June 30—	Construction.	Operation and maintenance during construction.	Total cost.
1908	$172,596.63		$172,596.63
1909	32,143.75		32,143.75
1910	26,369.09		26,369.09
1911	25,178.79		25,178.79
1912	30,424.90		30,424.90
1913	176,585.45		176,585.45
1914	296,911.39		296,911.39
1915	808,273.43		808,273.43
1916	406,831.86	$15,960.32	422,792.18
1917	193,439.59	[1] 8,543.83	184,895.76
1918	193,857.45	12,833.61	206,691.06
Plant and clearing accounts to June 30, 1918	63,763.76		63,763.76
Total	2,426,376.09	20,250.10	2,446,626.19

[1] Deduct.

Estimated cost of contemplated work, St. Mary storage unit, during fiscal year 1919.

Features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys—Surveys, etc		$1,600
Storage works:		
Sherburne Lakes Dam	$18,200	
Sherburne Lakes spillway	19,500	
Sherburne Lakes outlet	4,000	
North hillside slide investigations—Sherburne Lakes Reservoir	3,800	
Rights of way—Sherburne Lakes Reservoir	5,500	
		51,000
Canal system—St. Mary main canal		4,000
Telephone system		200
Operation and maintenance during construction (water-rental basis):		
Operation	3,000	
Maintenance	9,000	
		12,000
Reimbursable accounts		200
Total		69,000

MONTANA, SUN RIVER PROJECT.

A. H. AYERS, project manager, Fort Shaw, Mont.

LOCATION.

Counties: Cascade, Choteau, Lewis and Clark, Teton.
Townships: 20 to 25 N., Rs. 6 E. to 8 W., Montana meridian.
Railroads: Chicago, Milwaukee & St. Paul; Great Northern.
Railroad stations and estimated population June 30, 1918: Ashuelot[1]; Bole, 70; Cordova[1]; Dracut[1]; Fairfield, 150; Fort Shaw, 50; Gilman, 200; Power, 100; Riebling[1]; Simms, 150; Sloan[1]; Sun River, 65; Vaughn.[1]

WATER SUPPLY.

Source of water supply: Sun River and tributaries, Deep Creek, Bowl Creek, and Basin Creek.

Area of drainage basins: Sun River, 1,070 square miles; Deep Creek, 260 square miles; Bowl Creek, 9 square miles; Basin Creek, 15 square miles.

Annual run-off in acre-feet: North Fork of Sun River, near Augusta, 1905–1915, and at Sun River diversion dam, 1916–17, maximum, 1,127,400; minimum, 375,700; mean, 677,200. Willow Creek, near Augusta, 1906–1917, maximum, 42,460; minimum, 8,070; mean, 23,160. Sun River, at Sun River, 1905–1912, and at Fort Shaw, 1913–1917, maximum, 1,289,000; minimum, 429,550; mean, 919,600. South Fork of Sun River, near Augusta, 1905–1917, maximum, 159,735; minimum, 28,027; mean, 86,200.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1918: 16,095 acres.
Area under water-right applications, season of 1918: 12,181 acres.
Area under rental contracts, season of 1918: 360 acres.
Area having vested water rights: 145.3 acres.
Length of irrigation season: May 1–October 10, 163 days.
Average elevation of irrigable area: 3,700 feet above sea level.
Rainfall on irrigable area: for 30 years, average 11.09 inches; 1917, 9.69 inches.
Range of temperature on irrigable area: −40° to 100° F.
Character of soil of irrigable area: Sandy loam, clay, adobe, and alluvium.
Principal products: Hay, grain, vegetables, and live stock.
Principal markets: Great Falls, Seattle, St. Paul, Minneapolis, and Chicago.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: March 26, 1908; November 19, 1910; March 28, 1911; March 2 and July 13, 1912; June 23, 1913; September 24, 1914; March 20 and March 26, 1915; January 15, 1916; March 14, 1917; and March 22, 1918.
Location of lands opened: Tps. 20 and 21 N., Rs. 1 to 3 W., Montana meridian.
Limit of area of farm units: 160 acres.
Duty of water: 2 acre-feet per acre at the farm.
Building charge per acre of irrigable land: $30 to $36.

Annual operation and maintenance charge: For the irrigation year 1917, $1.25 per acre of irrigable land entitling the water user to 1 acre-foot of water per irrigable acre, with an additional charge of 50 cents for each additional acre-foot of water used. For the irrigation year 1918, $1.70 per acre of irrigable land, entitling the water user to 1¼ acre-feet of water per irrigable acre, with an additional charge of 50 cents for each additional acre-foot of water used.

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[1] Less than 25.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1905.
Construction recommended by board of engineers February 13, 1906.
Construction authorized by Secretary February 26, 1906.
Fort Shaw main canal completed July, 1908.
First irrigation by Reclamation Service season of 1909.
Fort Shaw unit completed December, 1909.
Willow Creek Dam completed, present development, November 7, 1911.
Sun River diversion dam completed March, 1915.
Entire project 39.9 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Sun River project, so far approved, provides for the storage of water in Sun River storage reservoir on the North Fork of Sun River, in the Willow Creek Reservoir on Willow Creek, and in Pishkun Reservoir north of Sun River; the diversion of water from the North Fork of Sun River through a supply canal for the Pishkun Reservoir; the diversion of water from Sun River, supplemented by stored waters released from Sun River storage and Willow Creek Reservoir, into a canal system watering lands mainly in the abandoned Fort Shaw Military Reservation; and the diversion of water from Pishkun Reservoir into the Sun River Slope Canal, supplying water for lands on the north side of Sun River.

Possible future development may include the diversion of water from Bowl and Basin Creeks, tributaries of Flathead River, across the Continental Divide to Sun River drainage; the diversion of water from the North Fork of Sun River into a supply canal for Willow Creek Reservoir; the diversion of flood waters from Deep Creek into Pishkun Reservoir; the construction of a reservoir on Muddy Creek and of a canal system leading therefrom for the irrigation of lands lying on the north side of Sun River in the vicinity of Vaughn and Manchester; the storage of water in Benton Lake Reservoir for the irrigation of lands lying north of Great Falls; and the diversion of water from the Sun River for the irrigation of lands lying west of Great Falls.

The United States claims all waste, seepage, unappropriated, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The Fort Shaw division, and the Willow Creek Reservoir (first development, 16,700 care-feet) have been completed. The Pishkun Canal (first development of 1,000 second-feet), and the Sun River Slope Canal (first development of 500 second-feet) have been completed except for priming, which is now in progress. The Greenfields Canal has been completed except for the lining of about 1½ miles with concrete, which is now in progress. The Greenfields South and Mill Coulee Canals have been excavated. The lateral system for about 25,000 acres under the Greenfields Canal is now being constructed.

SUMMARY OF GENERAL DATA FOR SUN RIVER PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:		
Irrigable acreage when project is complete		173,795
Public land entered to end of fiscal year	55,653	
Public land open to entry at end of fiscal year	1,252	
Public land withdrawn at end of fiscal year	36,805	
State land	12,389	
Private land	67,696	
Acreage service could have supplied season of 1917		16,244
Decrease in fiscal year, 1918		149
Estimated addition in fiscal year 1919		25,000
Estimated acreage service can supply July 1, 1919		41,095
Acreage actually irrigated, season of 1917		6,675
Acreage cropped under irrigation, season of 1917		[1] 7,445
Acreage dry farmed, season of 1917		567.25

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[1] Acreage cropped on 176 farms using water season 1917, of which 6,655 acres were irrigated; 20 acres were irrigated other than farms, making a total of 6,675 acres irrigated on the project. Value of crops on above 176 units is on a cropped area of 7,445 acres.

Crops:			
Value of irrigated crops, season of 1917			$219, 130. 00
Value of irrigated crops per acre cropped			29. 43
Value of crops dry farmed, season of 1917			7, 320. 00
Value of crops dry farmed per acre cropped			12. 91
Finances:			
Net construction cost to end of fiscal year			$3, 424, 313. 01
Per cent complete at end of fiscal year			39. 9
Appropriated for fiscal year 1919, total			$322, 000. 00
Allotment for construction, fiscal year 1919			$301, 000. 00
Estimated per cent complete, June 30, 1919			43. 2
Proposed appropriation, fiscal year 1920, for construction			$118, 000. 00
Estimated gross construction cost to June 30, 1920			$3, 878, 000. 00
Estimated per cent complete, June 30, 1920			44
Announced construction charges per acre			$30 and $36
Appropriation, fiscal year 1918		$128, 000. 00	
Increase under 10 per cent provision of act		[1] 45, 300. 00	
Total appropriation			$173, 300. 00
Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$150, 159. 12		
Transfers	14, 237. 93		
		164, 397. 05	
Registered liabilities chargeable to 1918 appropriation		8, 327. 00	
			172, 724. 05
Unencumbered balance, July 1, 1918			575. 95
Repayments:			
Value of construction water-right contracts			$400, 428. 46
Construction charges—			
Accrued to end of fiscal year			112, 746. 65
Collected to end of fiscal year			109, 284. 63
Uncollected at end of fiscal year			3, 462. 02
Operation and maintenance charges (public notice)—			
Accrued to end of fiscal year			$64, 328. 20
Collected to end of fiscal year			60, 135. 08
Uncollected at end of fiscal year			4, 193. 12
Drainage: Estimated acreage damaged by seepage to end of fiscal year.			2, 200

CONSTRUCTION DURING FISCAL YEAR.

At the beginning of the fiscal year work by Government forces was in progress on the priming and puddling of the North Side Canal system, the construction of an operation road along the North Side Canals, the construction of additional laterals and structures in the first unit of the Greenfields division, and the construction of a telephone system for the operation of the first unit of the Greenfields division. Work under suspended contract with the West Coast Construction Co. and Hans Pederson was also in progress on the construction of structures for the first unit of the Greenfields division.

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[1] Consists of increase of 10 per cent of appropriations ($12,800), plus $32,500 refunds authorized to be added to 1918 appropriations by sundry civil act of June 12, 1917.

Storage system, Willow Creek Reservoir.—The work of raising the crest of the dam and excavating the spillway channel, being performed by I. J. Denton under contract, was completed July 7, 1917.

North Side Canal system.—The work of priming and puddling the North Side Canal system was continued, the two hydraulic sluicing plants being continued in operation on the Pishkun Canal until late in the fall. The results accomplished, although local in their character, were effective in reducing the leakage from the canal at the points thus treated. Local blanketing with teams and scrapers was also continued where the bank was too porous to be benefited by the sluicing method. On account of the lack of wasteway facilities it was found impracticable to run more than a small head of water below the Green Timber Wasteway at mile 4.7 of the Pishkun Canal. In order that a larger head might be carried in the remaining 7 miles of the Pishkun Canal and in the 25 miles of the Sun River Slope Canal, an opening was cut in the lower bank of the latter canal at mile 13 and another at the head of the Greenfields Canal in Big Coulee to serve as temporary wasteways during the priming and puddling operations. In June, 1918, under contract with the Flowerree Sheep and Horse Co., a temporary wasteway was built by this company at mile 13 of the Sun River Slope Canal to permit the wasting of about 200 second-feet. This permits the running of a much larger priming head in the Sun River Slope Canal. The water wasted was utilized by the company for irrigation of a large area of grain and forage crops, as their canal was temporarily out of commission on account of bad breaks and slides in its upper reaches.

In the course of priming the Greenfields Canal, which is built on a steep side hill through broken and seamy sandstone and shale, it became apparent that it would be necessary to line with concrete about 1½ miles, as the porous rock allowed the water to seep through the bed of the canal, saturate the outer toe of the bank, and cause extensive slides. During the fall of 1917 trimming of canal slopes preparatory to lining was carried on, a gravel pit stripped, and screens and bins installed. During May and June of 1918 the delivery of gravel was carried on, drain tile laid, and the trimming of canal slopes continued. Due to a shortage of funds, little work was done on the canal system.

Lateral system, Greenfields division.—Work on construction of laterals and structures under specifications 358, which was begun late in the fiscal year 1917, was prosecuted vigorously until about December 1, when all the work contemplated for present construction was completed, with the exception of installing the gates on the turnouts. Labor was difficult to secure, the work was scattered, and costs consequently were high. Part of the lateral work was carried out under informal contracts dated August 29, 1917, with I. J. Denton and F. T. King. Work under these contracts was completed in November, 1917.

Work on suspended contract No. 649 with the West Coast Construction Co. and Hans Pederson, as carried on by the contractors' sureties, made very slow progress, and closed altogether on August 4, 1917. On September 29, 1917, the sureties' supplemental contract was formally suspended, the United States entering into a supplemental contract with the sureties whereby the United States would complete the work. At the time of suspension the contract was only about 42 per cent complete, although the original time limit for the completion of the work had expired 15 months previous. After the suspension of the contract, the plant, equipment, and supplies of the contractor were taken over by the United States and the completion of the remaining work commenced. Some progress was made during the late fall with the force that had been engaged on work under specifications 358, and early in the spring of 1918 a larger force was organized and the work pushed vigorously. Good progress was made, and at the end of the fiscal year the work remaining at the time it was taken over by the United States was 38 per cent complete.

SEEPAGE AND DRAINAGE.

About 13 per cent of the 16,095 acres of the Fort Shaw unit is affected by seepage or alkali. Two or three seeped areas have become somewhat enlarged during the past year, although the increase in acreage has been comparatively small. One new distinct area of small size has appeared, but the crops raised thereon have been only slightly affected, except as regards the ability to harvest them. In 1917, 11 farm units were inspected with respect to increased seeped areas. A total increase of 38.22 acres was found, and temporary deductions in acreages upon which charges are based were made accordingly. Cropping on wet or alkalied land was tried by various farmers in 1917, but the results obtained were not encouraging.

No action has been taken by the farmers leading to the ultimate drainage of the seeped lands. The adverse action of the water-users' association on March 28, 1914, is the last recorded expression of the sentiment of the water users regarding the matter of drainage.

Drainage Engineer D. W. Murphy, from the office of the chief of construction, visited the project July 3 and August 29, 1917, inspected the land affected by seepage, and reported tentatively on the cost of reclaiming the seeped areas.

OPERATION AND MAINTENANCE.

The irrigation season of 1917, according to notice to water users, issued April 30, 1917, extended from May 1 to October 10. Considerable precipitation occurred in May, the first 10 days of June, and in September. The principal crop-growing and crop-maturing period, comprising the latter part of June and the months of July and August, was very dry. The amount of rainfall during the irrigation season was only about 7 inches, compared to an average of 10.44 inches for the past five years, including 1917.

The Fort Shaw Canal system was operated continuously throughout the season. A washout in lateral D and a slide and washout of the lower bank of lateral K required the shutting down of these laterals for repairs and delayed deliveries for a day or two. Otherwise the breaks on the system were of minor importance and interfered little with operation. Fifty-seven per cent of the amount of water delivered to users during the season was delivered in the month of July, more water being delivered during that month than for any other corresponding month since the project was opened. The total amount diverted in 1917 was 25,481 acre-feet, of which 9,026 acre-feet were delivered to 176 farms and 65 acre-feet to town sites, school districts, etc. The amount of water delivered per acre was 1.36 acre-feet; 6,655 acres were irrigated in 1917, compared to 4,707 for 1916 and 4,261 for 1915. The operation and maintenance charge was $1.25 per irrigable acre whether water was used or not, entitling the user to 1 acre-foot per irrigable acre. Additional water was furnished for 50 cents per acre-foot.

The maximum amount of water stored in Willow Creek Reservoir during the irrigation season of 1917 was 11,545 acre-feet. On December 31 the maximum for the year, 12,782 acre-feet, was impounded. No storage water was used for irrigation during the season, as the natural flow of Sun River was sufficient to supply demands.

Maintenance work began about the middle of April, 1917, and continued until the ground froze in December. From June until December the ditches were in good condition for repair and excellent progress was made cleaning laterals and raising and strengthening lateral banks. Few structures were installed, but it was found necessary to do considerable temporary repair work. During the winter a crew of men and teams was employed at the Fort Shaw Canal headworks quarrying and hauling rock and cutting and hauling logs and brush. Jutting from the south bank of Sun River above the headworks two log spur cribs were constructed and about 280 linear feet of riprap were placed as protection against the serious erosion which began in the summer of 1917.

Favorable weather prevailed in the spring of 1918, but a scarcity of labor delayed maintenance work early in the season. Later three crews were organized and good progress was made installing structures, cleaning laterals, and completing river protection work at the Fort Shaw Canal headworks.

The operation season for 1918 opened May 1. Although the weather for May was unusually cool, heavy demands for irrigation water were received and a large acreage was irrigated. In June 4,923 acres were watered, which established a monthly record for the number of acres irrigated. Due to the general demand, it was found necessary for about a week to limit the size of deliveries to 1½ second-feet to each farm served.

Historical review, Sun River project.

Item.	1912	1913	1914	1915	1916	1917	[1] 1918
Acreage for which Service was prepared to supply water	16,346	16,346	16,346	16,346	16,322	16,224	16,095
Acreage irrigated	6,824	7,419	6,613	4,261	[2] 4,717	[3] 6,675	7,157
Miles of canal operated	121	121	110	100	100	100	93
Water diverted (acre-feet)	20,392	20,566	24,762	15,538	17,841	25,481	15,576
Water delivered to land (acre-feet)	11,688	11,187	11,468	4,653	[4] 5,757	[5] 9,091	6,707
Per acre of land irrigated (acre-feet)	1.71	1.5	1.73	1.1	1.22	1.36	.94

[1] To June 30.
[2] Includes 10 acres irrigated other than farms.
[3] Includes 20 acres irrigated other than farms.
[4] Includes 32 acre-feet delivered to town sites, etc.
[5] Includes 65 acre-feet delivered to town sites, etc.

SETTLEMENT.

Excellent returns for farm products for the past few years have encouraged the farmers to improve their holdings and adopt better farming methods, such as rotation of crops, leveling of land, deeper plowing, etc. The 1917 crop was good, and hay and grain, beef, dairy and poultry products sold readily at excellent prices.

Real estate transfers show an advance in values and an increased demand for irrigated land at prices ranging from $50 to $85 per acre. As a rule, the recent purchasers of land have been business men and others who have lived on the project for a number of years and have been impressed with the security of an investment in irrigated land by observing the results of farmers who have used good agricultural methods in their farming operations.

Taxes and insurance are comparatively light. Interest rates run from 7 to 12 per cent per annum. Farm residences have been enlarged and improved, barns and other stock buildings have been substantially constructed, and new and improved farm machinery has been added to the farmer's equipment.

There are 216 farms on the project held by entrymen and private owners which have water rights. During the present irrigation season 5 farms under private ownership having a total irrigable area of 291.88 acres and 2 public-land units of 80 acres each have taken out water-right applications. One tract of State land having 48 acres irrigable passed into private hands and water-right application was filed thereon.

During the fiscal year ending June 30, 1918, there were 8 homestead entries covering 645.85 acres, 3 relinquishments representing 253.4 acres, 8 assignments for 364.02 acres, and 2 transfers of title of 156.65 acres. No cancellations were made.

Settlement data, Fort Shaw unit, Sun River project.

Item.	1913	1914	1915	1916	1917	1918
Total number of farms on project	195	199	270	265	254	[1]252
Population	....	523	590	[1]600	[1]640	[1]650
Number of irrigated farms	179	172	200	158	176	[1]184
Operated by owners or managers	141	159	126	103	120	[1]123
Operated by tenants	38	13	74	55	56	[1]61
Population	....	490	565	436	476	[1]480
Number of towns	3	3	3	3	3	3
Population	....	203	173	179	168	[1]168
Total population in towns and on farms	....	726	763	779	808	[1]818
Number of public schools	4	4	4	4	4	4
Number of churches	1	3	3	3	4	4
Number of banks	....	1	1	1	1	1
Total capital stock	....	$20,000	$20,000	$20,000	$20,000	$20,000
Amount of deposits	....	....	$44,000	$85,000	$95,000	$86,000
Number of depositors	....	....	300	290	310	368
Number of relinquishments	6	3	6	4	1	3
Number of cancellations	1	5	3	2	....	....
Homestead entries	6	4	13	5	5	8

[1] Estimated.

PRINCIPAL CROPS.

As in previous years since 1913, alfalfa was the chief crop in 1917, with 4,370 acres, a gain of more than 250 acres over that of 1916. The average yield of alfalfa hay was somewhat lower than in former years, but the quality was excellent. The season was unusually favorable for the production of alfalfa seed and yields running as high as 12 bushels per acre were reported. Wheat was the second crop both in acreage and value. On land previously in beets or potatoes, 60 to 70 bushels per acre were produced. On alfalfa ground, plowed, seeded, and thoroughly irrigated at the proper time, the yields ran from 26 to 46 bushels per acre. Fair yields per acre for barley and oats were secured, but the acreage was lower than for a number of years past. The potato acreage was large and the yield excellent, but a scarcity of labor and two cold snaps in the fall prevented a quick harvest, resulting in a considerable loss to growers.

The gross value of all crops produced on the Fort Shaw unit in 1917 was $226,450, compared to $129,063 for the previous year. The average value per acre for the units using water was $29.43 and for the units farmed "dry" the returns were $12.91 per acre. The prices for principal farm products varied between limits about as follows:

Alfalfa hay in field or stack	per ton	$15.00 to $24.00
Alfalfa hay baled	do	18.00 to 25.00
Barley	per bushel	.84 to 1.66
Oats	do	.59 to 1.00
Wheat	do	1.86 to 2.00
Potatoes	do	.50 to 1.80
Flax	do	2.78 to 3.70
Hogs	per pound	.14 to .17

The spring of 1918 was the driest on record. There was cold weather in May and the frosts in that month injured the alfalfa to some extent. As the usual spring rains failed, it was necessary to irrigate the spring grain out of the ground, resulting in an uneven and in some places scant stand. Indications are that the grain crops will be fair. Notwithstanding the damage by frost, the first cutting of alfalfa hay is yielding well.

Crop report of farm units using water, Fort Shaw unit, Sun River project, Montana, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	4,250	Ton	7,087	1.7	$17.00	$120,479	$28.34
Alfalfa seed	62	Bushel	391.5	6.3	10.80	4,228	68.20
Barley	89	...do	2,192	24.6	1.00	2,192	24.63
Flax	110	...do	439	4	2.90	1,273	11.57
Fruits, small	2.5	Pound	2,067	526.8	.15	310	124.00
Garden	56	Acre			105.18	5,890	105.18
Hay	294	Ton	275.5		14.11	4,147	14.11
Oats	439	Bushel	10,924	24.9	.85	9,285	21.15
Pasture	810.5	Acre			5.10	4,136	5.10
Peas	7	Bushel	65	9.3	1.50	97	13.93
Potatoes, white	165	...do	28,704.3	174.3	.90	25,833	156.85
Wheat	1,160	...do	21,716	18.7	1.90	41,260	35.57
Total cropped	7,445	Total and average				219,130	29.43

Crop report of farm units using water, Fort Shaw unit, Sun River project, Montana, year of 1917—Continued.

		Areas.	Acres.	Number of farms.	Per cent of project.
Number of acres irrigated on 176 farms	6,655	Total irrigable areas cropped	10,059.39	[1] 176	62
Total other purposes	20	Total irrigable area farms reported less temporary reductions for seepage, etc	8,532.48	[1] 176	52.59
Grand total irrigated	6,675	Total irrigated area farms reported:			
		Under water right applications	6,148	168	39.74
		Under rental contracts	125	5	.77
		Under vested rights	82	3	.50
		Total cropped area farms reported	7,445.2	176	45.89

[1] One unit not cropped.

Crop report, farm units farmed "dry," Fort Shaw unit, Sun River, Montana, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	52	Ton	65.5	1.26	$17.00	$1,113	$21.41
Alfalfa seed	6	Bushel	12	2	10.80	130	21.60
Flax	38	...do	304	8	2.90	881	23.20
Garden	.75	Acre				325	433.33
Hay, except alfalfa	80	Ton	60.5	.76	13.07	790	9.88
Pasture	296	Acre			1.35	401	1.35
Potatoes, white	7.5	Bushel	1,100	146.67	.90	990	132.00
Wheat	87	...do	1,416	16.28	1.90	2,690	30.92
Total cropped	567.25	Total and average				7,320	12.91

Areas.	Acres.	Number of farms.	Per cent of project.
Total irrigable area farms reported	923.66	17	5.69
Total irrigable area farms reported less seepage, etc	264.47	17	1.63
Total cropped area farms reported	567.25	17	3.50

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, MARCH 22, 1918.

1. **Annual operation and maintenance charges.**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charges for the irrigation season of 1918 and thereafter until further notice, against all lands of the Fort Shaw unit, Sun River project, Montana, under public notice, shall be a minimum charge of $1.70 per irrigable acre whether water is used thereon or not, which charge will permit the delivery of not to exceed 1½ acre-feet of water per irrigable acre; and that additional water will be furnished for 50 cents per acre-foot. All operation and maintenance charges will be due and payable on March 1 of each year for the preceding irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15, or where

water-right application is made after August 1, for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Sun River project, June 30, 1918.

Cash		$1,980.65
Inventory of stock on hand		66,617.79
Accounts receivable		307,249.09
Construction work contracted		92,163.77
Construction cost	$3,458,678.69	
Less construction revenue earnings	34,365.68	
		3,424,313.01
Operation and maintenance cost	114,180.65	
Less operation and maintenance revenue earnings	985.17	
		113,195.48
Total		4,005,519.79
Accounts payable		34,113.07
Contingent obligations		94,141.67
Reserves for repayment to reclamation fund of cost of project		498,309.48
Miscellaneous accruals		23,164.68
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	$3,710,541.88	
Collection, transfer, refund, and joint construction vouchers issued	354,750.99	
Net investment		3,355,790.89
Total		4,005,519.79

Feature costs of Sun River project to June 30, 1918.

Features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys:		
Examination and surveys	$1,606.80	$51,375.26
Experimental flumes	38.92	591.20
Experimental measuring devices		225.02
Experimental concrete pipe and blocks	10.35	94.76
	1,656.07	52,286.24
Storage works:		
Willow Creek Reservoir Dam and outlet work	[1] 7,988.83	282,249.46
Warm Springs Reservoir (site)	[1] 921.66	31,796.93
Beaver Creek Reservoir (site)	582.82	26,816.62
Pishkun Reservoir		35,961.53
Muddy Creek Reservoir		736.42
Benton Lake Reservoir		1,713.59
	[1] 8,327.67	379,274.55
Canal system:		
Fort Shaw Canal		233,203.52
Pishkun Canal	15,112.97	1,216,848.07
Sun River Slope Canal	13,101.49	610,984.33
Greenfields Main Canal	18,889.13	176,130.56
Teton Canal		19,719.76
Greenfields Lake Canal		363.22
Sunnyside Canal		1,732.09
	47,103.59	2,258,981.55
Lateral system:		
Fort Shaw division		206,362.21
Sun River Slope division		1,379.61
Greenfields division	137,039.00	375,099.67
Mill Coulee division	[1] .04	12,549.61
Teton division		454.17
	137,038.96	595,845.27

[1] Deduct.

Feauture costs of Sun River project to June 30, 1918—Continued.

Features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Farm units:		
Fort Shaw division	23.01	3,198.30
Greenfields division	1,355.63	14,052.19
	1,378.64	17,250.49
Permanent improvements:		
Buildings—		
Simms	66.99	1,515.16
Gilman	....	2,175.60
Willow Creek	38.20	888.42
Sun River diversion	358.01	1,306.41
Camp No. 9	....	1,801.80
Camp No. 11	....	1,607.32
Camp No. 12	....	1,748.66
Camp No. 13 (Fairfield)	1,145.36	1,620.58
Camp No. 14	....	1,733.51
Bridge across Sun River at Fort Shaw	....	634.09
Roads:		
Gilman to Sun River diversion	478.77	10,404.55
Sun River diversion to Warm Springs	23.72	18,518.97
	2,111.05	43,955.07
Telephone system:		
Great Falls to Willow Creek	....	7,474.70
Willow Creek to Warm Springs	....	4,138.67
Willow Creek cut-off to north side line	196.64	413.74
Sun River diversion to Greenfields Main Canal, station 225	446.92	7,170.34
Greenfields Main Canal, station 225 to Fort Shaw	....	3,412.70
Greenfields division local lines	819.03	6,346.07
	1,462.59	28,956.22
Balance in plant account	640.27	59,481.88
Operation and maintenance charges transferred to and compounded with construction charges	[1] 63.55	2,678.90
Balance in unadjusted clearing accounts	16,091.62	19,968.52
Gross construction cost to June 30, 1918	199,091.57	3,458,678.69
Less revenues earned during construction period:		
Rentals of buildings	[1] 256.58	14,389.31
Rentals of grazing and farming lands	[1] 9,873.16	....
Rentals of telephone and tolls	1.00	318.55
Contractors' freight refunds	[1] 127.94	18,253.85
Other revenues, unclassified	[1] 12,207.04	2.50
Profit on hospital operations	236.31	1,401.47
Net cost	[1] 22,227.41	34,365.68
Net cost of construction of project to June 30, 1918	....	3,424,313.01

[1] Deduct.

Statement of cost by calendar years, Sun River project.

Year ending Dec. 31—	Construction.	Operation and maintenance under public notice.	Total cost.
1902	$617.52	....	$617.52
1903	2,022.96	....	2,022.96
1904	11,543.66	....	11,543.66
1905	34,821.28	....	34,821.28
1906	20,824.18	....	20,824.18
1907	241,530.67	....	241,530.67
1908	81,108.04	$8,930.75	90,038.79
1909	56,344.93	14,471.51	70,816.44
1910	148,541.21	9,413.27	157,954.48
1911	100,157.42	6,849.71	107,007.13
1912	211,855.71	9,762.99	221,618.70
1913	232,342.46	12,517.66	244,860.12
1914	907,346.92	11,060.87	918,407.79
1915	899,685.75	6,926.24	906,611.99
1916	248,343.33	13,262.25	261,605.58
1917	172,059.59	11,622.67	183,682.26
January to June 30, 1918	89,533.06	9,362.73	98,895.79
Total	3,458,678.69	114,180.65	3,572,859.34

Statement of cost by fiscal years, Sun River project.

Year ending June 30—	Construction.	Operation and maintenance under public notice.	Total cost.
1903	$622.52		$622.52
1904	2,281.04		2,281.04
1905	29,205.07		29,205.07
1906	26,466.71		26,466.71
1907	94,159.97		94,159.97
1908	210,165.72		210,165.72
1909	44,331.02	$21,275.23	65,606.25
1910	79,794.09	11,188.34	90,982.43
1911	156,749.52	4,063.00	160,812.52
1912	69,091.12	5,855.26	74,946.38
1913	274,344.16	13,997.50	288,341.66
1914	555,879.09	11,188.54	567,067.63
1915	906,948.10	8,731.58	915,679.68
1916	644,573.32	9,882.00	654,455.32
1917	164,975.67	12,277.01	177,252.68
1918	199,091.57	15,722.19	214,813.76
Total	3,458,678.69	114,180.65	3,572,859.34

Estimated cost of contemplated work, Sun River project, during fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys:		
General	$1,900	
Experimental investigations	100	$2,000
Storage works—Pishkun Reservoir, Dam No. 4, and temporary spillway		25,000
Canal system:		
Pishkun Canal	10,000	
Sun River Slope Canal	30,000	
Greenfields Canal	81,000	121,000
Lateral system:		
Greenfields division, first unit (laterals and structures)	102,000	
Greenfields division, second unit (surveys and designs)	6,500	108,500
Drainage system—Greenfield's division, first unit (investigations)		1,000
Permanent improvements:		
Fairfield operation headquarters	10,800	
S. R. D., Warm Springs Road	2,200	13,000
Telephone system—Fort Shaw to Fairfield and Great Falls connections		4,000
Operation and maintenance during construction (water-rental basis), North side Canal and Greenfields first unit (one-half year only)		23,000
Operation and maintenance under public notice, Fort Shaw division		14,000
Reimbursable accounts		[1] 500
Total		311,000

[1] Deduct.

Operating costs and revenues, Sun River project, to June 30, 1918.

EXPENSES.

Features.	Fiscal year 1918.			To end of fiscal year 1918		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works: Willow Creek Reservoir	$2,319.44	[1] $2,445.24	[1] $125.80	$5,220.09	$1,654.29	$6,874.38
Canal system: Fort Shaw, main canal	1,185.46	5,002.26	6,187.72	7,802.51	25,453.59	33,256.10
Lateral system:						
Lateral A	732.15	1,591.85	2,324.00	6,092.18	18,668.73	24,760.91
Lateral C	435.78	1,316.27	1,752.05	3,815.50	13,669.40	17,484.90
Lateral D	991.95	2,356.59	3,348.54	5,936.34	8,382.31	14,318.65
Laterals K and H	407.55	1,717.07	2,124.62	3,748.30	14,400.76	18,149.06
	2,567.43	6,981.78	9,549.21	19,592.32	55,121.20	74,713.52
Undistributed expenses:						
Engineering and inspection	49.01		49.01	52.41		52.41
General expense	[1] 3.91		[1] 3.91	208.44		208.44
Superintendence and accounts	[1] 268.09		[1] 268.09	216.36		216.36
Farming operations	468.61		468.61	1,572.10		1,572.10
Cribwork, Fort Shaw, main canal, headworks	163.74		163.74	163.74		163.74
Guarding structures at Willow Creek Dam	[1] 197.50		[1] 197.50	[1] 197.50		[1] 197.50
	211.86		211.86	2,015.55		2,015.55
Plant account	[1] 164.35		[1] 164.35			
Total cost	6,119.84	9,538.80	15,658.64	34,630.47	82,229.08	116,859.55
Unpaid operation and maintenance charges added to construction			63.55			[1] 2,678.90
Net cost			15,722.19			114,180.65

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$11,248.87	$64.328.20
Operation and maintenance charges paid in advance by water-right applicants	90.34	210.29
Operation and maintenance charges paid and forfeited by water-right applicants	141.00	1,155.09
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	232.73	335.70
Rentals of irrigation water	411.09	917.94
Other revenues unclassified, earned during operating period		67.23
Discount allowed on operation and maintenance charges accrued on contracts with water-right applicants (contra)	[1] 345.77	[1] 896.84
Total	11,778.26	66,117.61
Difference (deficit)	3,943.93	48,063.04

[1] Deficit.

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

L. H. MITCHELL, project manager, Savage, Mont.

LOCATION.

Counties: Richland and Dawson, Mont.; McKenzie, N. Dak.

Townships: 18 to 26 N., Rs. 56 to 60 E., Montana meridian; 150 to 152 N., R. 104 W., fifth principal meridian.

Railroads: Northern Pacific, Great Northern, and Missouri River.

Railroad stations and estimated population June 30, 1918: Intake, 90; Burns, 25, Savage, 325; Crane, 40; Sidney, 1,800; and Fairview, Mont., 1,000; Dore, N. Dak., 30.

WATER SUPPLY.

Source of water supply: Yellowstone River.

Area of drainage basin: 66,000 square miles

Annual run-off in acre-feet: Yellowstone River at Intake, Mont., 1917, 14,130,000; maximum since 1909, 14,130,000; minimum since 1909, 8,900,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to deliver water, season of 1918: 42,232 acres.

Area under rental contracts, season of 1918: 32,559.

Area under water-right applications, season of 1918: 557 acres.

Length of irrigating season: May 1 to October 10—163 days.

Average elevation of irrigable area: 1,900 feet.

Rainfall on irrigable area: 12-year average, 15.56 inches; 1917, 8.81 inches.

Range of temperature on irrigable area: −46° to 110° F.

Character of soil of irrigable area: Deep sandy loam predominates, some alkali and gumbo.

Principal products: Grain, forage crops, and vegetables.

Principal markets: Minneapolis, St. Paul, and Duluth, Minn.; local markets consume forage crops and vegetables.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: December 21, 1908; March 7, March 24, May 1, August 28, and November 8, 1911; March 1, and April 30, 1912; February 26, May 28, June 23, and July 21, 1913; January 19, March 4, and September 24, 1914; February 5, March 2, March 17, and March 20, 1915; January 29, March 16, and April 12, 1916.

Location of lands opened: Tps. 18 and 19 N., R. 57 E.; Tps. 19 and 20 N., R. 58 E.; Tps. 21, 22, 23, 24, and 25 N., R. 59 E.; and T. 24 N., R. 60 E., Montana principal meridian; Tps. 150 and 151 N., R. 104 W., Fifth principal meridian.

Limit of area of farm unit: Public, 80 acres; private, 160 acres.

Duty of water: 2½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land, $42.50 and $45; rental charge for 1918, 50 cents per acre for 1½ acre-feet; additional water at the rate of 50 cents per acre-foot.

Annual operation and maintenance charge: 75 cents per acre for 1 acre-foot; additional water at the rate of 50 cents per acre-foot.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1903.

Construction recommended by board of engineers, April 23, 1904.

Construction authorized by Secretary, May 10, 1904.

Lower Yellowstone Dam completed, February 19, 1910.

First irrigation by Reclamation Service, season of 1909.

Entire project 87 per cent completed, June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Lower Yellowstone project provides for the diversion of water from the Yellowstone River at a point 18 miles below Glendive, Mont., into a canal on the west side of the river which extends down the valley to the confluence of the Yellowstone and Missouri Rivers, conveying water for the irrigation of land lying between the canal and the Yellowstone River. The fall of the water which will be discharged from the main canal into lateral KK at a point 19 miles below the headgates will be utilized to operate turbines direct-connected to centrifugal pumps for raising water to irrigate approximately 3,000 acres of excellent bench land.

The United States claims all waste, seepage, unappropriated spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The completed features are the Lower Yellowstone Dam and diversion works, the main canal for a distance of 66.4 miles, and the complete lateral system in connection therewith. Sublaterals and extensions of a few main laterals will be constructed as the needs of water users require.

The features for future construction are the pumping plant, the remaining 5 miles of the main canal, and about 52 miles of laterals, which, when completed, will irrigate approximately 15,500 acres.

SUMMARY OF GENERAL DATA FOR LOWER YELLOWSTONE PROJECT TO END OF FISCAL YEAR 1918.

Areas:			
Irrigable acreage when project is complete			60, 116
Public land entered to end of fiscal year		14, 813	
Public land open to entry at end of fiscal year		91	
Public land withdrawn at end of fiscal year		1, 812	
State land		1, 653	
Private land		41, 747	
Acreage service could have supplied season of 1917			42, 232
Estimated acreage service can supply July 1, 1920			42, 232
Acreage actually irrigated, season of 1917			15, 744
Acreage cropped under irrigation, season of 1917			15, 659
Acreage dry farmed, season of 1917			8, 739
Crops:			
Value of irrigated crops, season of 1917			$459, 557. 00
Value of irrigated crops per acre cropped			29. 35
Value of dry-farmed crop, season of 1917			90, 550. 00
Value of dry-farmed crop, per acre cropped			10. 36
Finances:			
Net construction cost to end of fiscal year			$2, 891, 205. 17
Per cent complete at end of fiscal year			87
Appropriated for fiscal year 1919, total			$55, 000. 00
Estimated per cent complete, June 30, 1919			87
Estimated total construction cost to June 30, 1919			$2, 912, 796. 85
Estimated per cent complete, June 30, 1919			87
Announced construction charges per acre			$45. 00
Appropriation, fiscal year 1918			[1] $64, 843. 04
Expenditures during fiscal year chargeable to 1918 appropriation:			
Disbursements	$30, 884. 23		
Transfers issued	294. 97		
		$30, 589. 26	
Registered liabilities chargeable to 1918 appropriation		3, 630. 25	
Contract obligations wholly covered by 1918 appropriation		11, 333. 00	
			45, 552. 51
Unencumbered balance, July 1, 1918			19, 290. 53

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[1] Includes refunds authorized to be added to 1918 appropriation by sundry civil act approved June 12, 1917.

Repayments:		
Value of construction water-right contracts		1,243,428.10
Construction charges—		
Accrued to end of fiscal year		71,202.35
Collected to end of fiscal year		10,044.75
Uncollected at end of fiscal year		61,157.60
Operation and maintenance charges (public notice)—		
Accrued to end of fiscal year		138,058.05
Collected to end of fiscal year		35,835.08
Uncollected at end of fiscal year		102,222.97
Water-rental charges—		
Accrued to end of fiscal year		67,455.34
Collected to end of fiscal year		65,328.13
Uncollected at end of fiscal year		2,127.21
Drainage:		
Estimated acreage damaged by seepage to end of fiscal year		1,300
Miles of drain built to end of fiscal year—		
Open	4.5	
Closed	1.1	
Total		5.6
Estimated acreage protected by drains built to end of fiscal year		1,600
Estimated acreage to be protected by authorized system		1,600
Cost of drainage works to end of fiscal year		$76,569.62

SEEPAGE AND DRAINAGE.

No drains were constructed during the year. The completed portion of Drain No. 1 has drained the seeped area along both sides, and satisfactory crops are being raised. The total seeped area on the project has not changed materially since 1914.

The areas exempted from water charges because of seepage for the past four years are as follows: 1914, 1,276 acres; 1915, 1,239 acres; 1916, 1,247 acres; 1917, 1,360 acres.

OPERATION AND MAINTENANCE.

During the season of 1917 water was delivered to 323 farms, with an irrigable area of 27,191 acres, and 15,744 acres were actually irrigated. This was the largest area irrigated since the opening of the project. From July 1 to August 10 the main canal was held almost continuously at peak load. The extreme drouth which continued through July and August resulted in an unprecedented number of calls for water. At times it was not possible to make all deliveries promptly or upon request. During the heaviest run the main canal gage, with a reading of 8.5, indicated a flow of 405 second-feet. The theoretical capacity of the main canal at this depth is computed at 610 second-feet. The loss in carrying capacity is due to the deposit of silt and the growth of willows and cottonwoods in the canal section.

One hundred and eighty miles of canal were operated and maintained during the year, comprising 66.3 miles of main canal and 113.7 miles of distributary ditches; 22 miles of canals that were available for the distribution of water were not used, and a considerable proportion of the laterals were used intermittently or for short periods only. The maintenance work on these laterals, due to the growth of grass and weeds, is much more expensive than on laterals being used continuously. The area irrigated comprises 37 per cent for which water is available. To irrigate this area, it was necessary to operate 89 per cent of the available canals.

On the night of July 10–11 a serious break occurred in the main canal at mile 10.4. The lower bank was entirely washed out for a distance of 30 feet, and the escaping water eroded the material to a depth of 6 feet below canal grade. Immediately after the break was discovered the water was turned out at the sluiceway 2 miles above this point, and two shifts of an average of six teams were engaged on the work on the 12th and 13th after preliminary repairs had been made on the 11th. Water was turned down the canal at 4 a. m on the 13th, after having been out 48 hours. Other breaks occurred in the distributary ditches, but no serious loss or damages were caused by these minor washouts.

At canal mile 8.3, where a branch of the Yellowstone River, or a slough, has been enlarging rapidly from year to year, it was necessary to place trees and brush to prevent the canal bank from being seriously eroded. After the high run of water a dam was constructed at the upper reach of the slough, not only to prevent further erosion to the main canal bank, but to protect the fill of the Northern Pacific Railway. This dam was constructed by the Northern Pacific Railway Co., in conjunction with the Reclamation Service.

Historical review, Lower Yellowstone project.

Item.	1913	1914	1915	1916	1917	1918 to June 30.
Acreage for which service was prepared to supply water	37,799	36,250	42,300	42,288	42,288	42,232
Acreage irrigated	7,660	5,743	12,656	6,020	15,744	12,430
Miles of canals operated	133	151	163	151	180	174
Water diverted (acre-feet)	30,088	25,769	40,141	27,181	60,205	27,040
Water delivered to land (acre-feet)	10,250	9,143	17,970	7,545	27,842	10,663
Per acre of land irrigated (acre-feet)	1.34	1.59	1.42	1.25	1.77	.86

SETTLEMENT.

To the people living on the project it appears that the project is securing new settlers very slowly, and that the development of the project is anything but encouraging. However, a comparison of the population and owners on the farms at the present time with the population and owners in 1913 shows clearly that the Lower Yellowstone project will eventually be classed among the successful reclamation projects. The following comparisons are interesting in showing the settlement and development since 1913:

	Population on irrigated farms.	Number per farm.	Owners on irrigated farms.
1913	388	1.9	114
1917	978	2.4	195

The population of the towns has probably increased faster than it should have. Since the proper size of any town eventually adjusts itself, this should not be considered detrimental.

During the year the following changes in ownership were made as compared with the changes in 1916:

	1916	1917
Transfers of land in private ownership	55	67
Assignments	11	25
Relinquishments	1	2
Homestead entries	2	2

Settlement data, Lower Yellowstone project.

Item.	1914 [1]	1915 [1]	1916 [1]	1917 [1]	1918 to June 30.[2]
Total number of irrigable farms on project	512	514	514	514	514
Population	700	821	821	978	985
Number of irrigated farms	184	260	260	186	298
Irrigable farms operated by owners	140	168	168	195	200
Irrigable farms operated by tenants	153	62	62	52	50
Irrigable farms having neither owner nor tenant living thereon	171	159	159	162	162
Number of towns	8	8	8	8	8
Population	1,750	2,145	2,145	3,310	3,500
Total population in towns and on farms	2,450	2,966	2,966	4,288	4,485
Number of public schools	16	19	19	19	19
Number of churches	4	5	5	5	8
Number of banks	9	9	9	10	10
Total capital stock of banks	$230,000	$230,000	$230,000	$330,000	$300,000
Amount of deposits	$715,000	$908,000	$1,388,000	$2,352,000	$2,000,000
Number of depositors	3,600	3,838	5,637	6,390	7,000

[1] Project on rental basis.

[2] Project on rental basis; estimated to June 30.

PRINCIPAL CROPS.

Alfalfa is the principal crop raised on the project and for the past two years has exceeded the area of any other crop. Wheat, flax, oats, and barley follow in the order named. The steady increase in alfalfa acreage for the past 6 years is shown by the following tabulation:

Year.	Alfalfa acreage.	Increase.	Year.	Alfalfa acreage.	Increase.
		Per cent.			*Per cent.*
1912	1,284	....	1915	6,055	45
1913	2,380	85	1916	6,962	15
1914	4,184	76	1917	8,693	23

This crop produced an average of 2 tons per acre in 1917, and the price per ton ranged from $15 to $18 in the stack. The yield was slightly below that of the previous year, but the average price has almost doubled since the summer of 1916. The total value of the alfalfa crop was $233,000 which was 42 per cent of the total value of all crops raised.

Wheat, which was the most important crop up to and including 1915 now occupies second place. This crop decreased in both acreage and yield during the past year. In 1916 the average yield was 12.2 bushels as compared with 10 bushels in 1917. The price per bushel, however, increased from $1.58 to $1.98. Irrigated wheat averaged 14.1 bushels per acre and the dry crop under the ditch was reduced to 4½ bushels per acre.

The following table shows the relative areas planted to various crops during the past 5 years:

Per cent of total crop area represented by selected crops.

Year.	Alfalfa.	Wheat.	Oats.	Barley.	Flax.	Total.
1913	12	42	14	12	7	87
1914	18	26	16	11	10	81
1915	27	38	15	6	5	91
1916	31	27	14	10	8	90
1917	36	21	9	5	13	84

The irrigated crop exceeded the value of the dry crop by $19 per acre. This was a greater difference than in any previous year and is, of course, accounted for by the abnormally dry season. The average return of $29.35 per acre for irrigated crops is the largest since the opening of the project. The reason for this is twofold. The farmers have a leaning toward more intensive crops, such as alfalfa, sugar beets, potatoes, and beans, and the war prices have aided in boosting the returns per acre.

Sugar beets were grown on the project in commercial quantities for the first time in 1917. The Great Western Sugar Co. of Billings, Mont., sent a representative early in the spring to make the necessary contracts and supervise the growing and harvesting of the crop. The beets started under rather unfavorable conditions. Lack of rainfall made it necessary to irrigate the seed in many cases in order to start germination. Wild oats, alfalfa, and weeds caused a number of fields to be abandoned and the hoped for 1,000-acre beet crop was finally reduced to 307 acres. The average yield was 8 tons per acre and the maximum 12.

Irrigated crop report, Lower Yellowstone project, Montana-North Dakota, year of 1917.

Irrigated crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	6,505	Ton	14,062	2.2	$15.30	$215,149	$33.07
Alfalfa, new	976	...do	73	.1	15.30	1,117	1.14
Alfalfa seed	28	Bushel	93	3.4	13.00	1,209	43.18
Barley	798	...do	14,646	18.4	1.00	14,646	18.35
Beans	88	...do	563	6.4	10.80	6,080	69.09
Beets, sugar	307	Ton	2,443	8.0	6.50	15,880	51.72
Corn	156	Bushel	4,252	27.3	1.40	5,953	38.15
Corn fodder	266	Ton	606	2.3	10.50	6,363	23.92
Flaxseed	1,239	Bushel	7,275	5.9	3.00	21,825	17.61
Garden	116					11,921	102.76
Hay	622	Ton	540	.9	12.50	6,750	10.85
Oats	1,526	Bushel	39,530	25.9	.70	27,671	18.13
Pasture	606					7,575	12.50
Potatoes	249	Bushel	28,557	115.0	1.15	32,841	131.89
Rye	28	...do	466	16.6	1.50	699	24.96
Wheat	2,963	...do	41,850	14.1	1.98	82,863	27.97
Miscellaneous	46					1,015	22.07
Less duplicated areas	860						
Total acreage cropped by irrigation	15,659	Total and average				459,557	29.35

Irrigated crop reports, Lower Yellowstone project, Montana-North Dakota, year of 1917—Continued.

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Irrigable area farms reported	27,191	323	[1] 69
Stubble	85	Irrigated area farms reported	15,744	323	40
Total irrigated	15,744	Under water right applications	1	1	....
		Under rental contracts	15,743	322	40
		Cropped area farms reported	21,510	323	55

[1] Based on present irrigable area.

Nonirrigated crop report, Lower Yellowstone project, Montana-North Dakota, year of 1917.

Dry-farmed crop.	Area (acres).	Unit of Yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	994	Ton	1,096	1.0	$15.30	$16,769	$16.87
Alfalfa, new	218	..do	....	....	....	....	....
Alfalfa, seed	101	Bushel	453	4.5	13.00	5,889	58.30
Barley	471	...do	3,552	7.5	1.00	3,552	7.54
Beans	153	...do	94	.6	10.80	1,015	6.63
Corn fodder	230	Ton	385	1.7	10.50	4,042	17.57
Flaxseed	2,053	Bushel	3,013	1.5	3.00	9,039	4.40
Garden	14	....	....	....	....	747	5.33
Hay	1,017	Ton	755	.7	12.50	9,438	9.28
Oats	704	Bushel	7,747	11.0	.70	5,423	7.70
Pasture	509	....	....	....	....	3,817	7.50
Potatoes	95	Bushel	7,410	78.0	1.15	8,522	89.67
Rye	110	...do	1,135	10.3	1.50	1,703	15.48
Wheat	2,255	...do	10,201	4.5	1.96	19,994	8.87
Miscellaneous	8	....	....	....	....	600	75.00
Less duplicated areas	193	....	....	....	....	....	....
Total acreage cropped without irrigation.	8,739	Total and average				90,550	10.36

FINANCIAL STATEMENT.

Project balance sheet, Lower Yellowstone project, June 30, 1918.

Cash		$1,637.41
Inventory of stock on hand		8,498.81
Accounts receivable		1,337,988.02
Construction cost	$2,912,796.85	
Less construction revenue earnings	21,591.68	
		2,891,205.17
Operation and maintenance cost	541,525.49	
Less operation and maintenance revenue earnings	75,718.83	
		465,806.66
Total		4,705,136.07
Accounts payable		41,329.08
Contingent obligations		1,637.41
Reserves for repayment to reclamation fund of cost of project		1,414,284.12
Miscellaneous accruals		1,857.00
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	3,482,842.89	
Collection, transfer, refund, and joint construction vouchers issued	236,814.43	
Net investment		3,246,028.46
Total		4,705,136.07

Feature costs of Lower Yellowstone project.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys		$66,006.54
Canal system	$38.25	2,414,329.97
Lateral system		290,069.83
Drainage system	129.00	77,319.62
Farm units		1,016.24
Permanent improvements		39,536.38
Telephone system		22,818.22
Operation and maintenance charges transferred to and compounded with construction charges		1,700.05
Gross construction cost to June 30, 1918	167.25	2,912,796.85
Less revenues earned during construction period:		
Rentals of buildings		422.00
Rentals of telephones and tolls		4,331.04
Contractors' freight refunds		21,261.33
Other loss on operations, unclassified		[1] 4,422.69
Subtotal of revenues		21.591.68
Net cost		2,891,205.17

[1] Deduct.

Statement of cost by calendar years, Lower Yellowstone project.

Year ending Dec. 31—	Construction.	Operation and maintenance.			Total cost.
		Under public notice.	Water rental.	Total.	
1904	$35,237.74				$35,237.74
1905	154,318.40				154,318.40
1906	396,619.33				396,619.33
1907	1,015,975.33				1,015,975.33
1908	919,876.95				919,876.95
1909	200,754.90	$109,192.21		$109,192.21	309,947.11
1910	40,775.64	51,124.14		51,124.14	91,899.78
1911	9,132.04	68,140.91		68,140.91	77,272.95
1912	3,897.73	128,399.74		128,399.74	132,297.47
1913	65,154.83	36,566.74		36,566.74	101,721.57
1914	37,015.03	5,703.72	$20,996.16	26,699.88	63,714.91
1915	14,180.56		27,900.80	27,900.80	42,081.36
1916	10,559.94		24,886.16	24,886.16	35,446.10
1917	9,081.88		32,411.78	32,411.78	41,493.66
Jan. to June 30, 1918	216.55		30,407.26	30,407.26	30,623.81
Plant accounts			5,795.87	5,795.87	5,795.87
Total	2,912,796.85	399,127.46	142,398.03	541,525.49	3,454,322.34

NOTE.—On account of transfer of supplementary construction costs from operation and maintenance to construction costs, figures for 1913, 1914, and 1916 as given in former annual report are revised in above table.

Statement of cost by fiscal years, Lower Yellowstone project.

Year ending June 30—	Construction.	Operation and maintenance.			Total cost.
		Under public notice.	Water rental.	Total.	
1906	$294,916.59				$294,916.59
1907	619,569.88				619,569.88
1908	978,590.28				978,590.28
1909	701,342.76	$51,080.95		$51,080.95	752,423.71
1910	166,404.76	84,490.87		84,490.87	250,895.63
1911	10,847.88	50,436.92		50,436.92	61,284.80
1912	1,024.98	122,486.08		122,486.08	123,511.06
1913	13,288.54	71,520.75		71,520.75	84,809.29
1914	69,984.50	19,111.89	$11,601.01	30,712.90	100,697.40
1915	36,657.00		21,327.09	21,327.09	57,984.09
1916	591.31		29,965.81	29,965.81	30,557.12
1917	19,411.12		26,194.93	26,194.93	45,606.05
1918	167.25		46,235.69	46,235.69	46,402.94
Balance plant account on June 30, 1917.			7,073.50	7,073.50	7,073.50
Total	2,912,796.85	399,127.46	142,398.03	541,525.49	3,454,322.34

NOTE.—On account of transfer of supplementary construction cost from operation and maintenance costs to construction costs, figures given for 1913, 1914, and 1917 in former annual report have been revised in above table.

Estimated cost of contemplated work, Lower Yellowstone project, during fiscal year 1919.

Principal features—Operation and maintenance during construction (water-rental basis)........$55,000

Operating costs and revenues, Lower Yellowstone project, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Canal system—Main canal	$1,873.09	$13,438.16	$15,311.25	$33,586.02	$154,366.62	$187,952.64
Lateral system	2,965.13	13,478.59	16,443.72	25,475.11	125,326.20	150,801.31
Drainage system		112.56	112.56		112.56	112.56
Undistributed expenses:						
Maintenance and permanent improvements		747.13	747.13		866.63	866.63
Camp maintenance		1,098.62	1,098.62		57,152.00	57,152.00
Superintendence and accounts		5,088.17	5,088.17		7,169.43	7,169.43
General expense		8,711.87	8,711.87		13,477.22	13,477.22
Telephone maintenance					10,872.52	10,872.52
Farm operation and maintenance				7,079.98	6,907.35	13,987.33
		15,645.79	15,645.79	7,079.98	96,445.15	103,525.13
Diversion dam at intake					93,337.98	93,337.98
	4,838.22	42,675.10	47,513.32	66,141.11	469,588.51	535,729.62
Plant accounts		1,277.63	1,277.63		1,277.63	5,795.87
Total	4,838.22	41,397.47	46,235.69	66,141.11	468,310.88	541,525.49

Operating costs and revenues, Lower Yellowstone project to June 30, 1918—Contd.

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applications	$571.09	$138,058.05
Operation and maintenance charges paid in advance by water-right applicants		622.21
Operation and maintenance charges paid and forfeited by water-right applicants		440.00
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	2.55	2.59
Rentals of buildings during operating period	786.00	7,016.59
Rentals of irrigation water	21,763.50	67,455.34
Rentals of telephones and tolls during operating period		499.97
Other revenues unclassified, earned during operating period	903.99	746.93
Less discount allowed on operation and maintenance charges accrued on contracts with water right applicants		4.63
Total	24,027.13	214,837.05
Difference (deficit)	22,208.56	326,688.44

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

ANDREW WEISS, project manager, Mitchell, Nebr.

LOCATION.

Counties: Sioux, Scotts Bluff, Banner, and Morrill, Nebr.; Natrona, Carbon, Converse, Goshen, and Platte, Wyo.

Townships: 19 to 27 N., Rs. 48 to 67 W.; 26 to 30 N., Rs. 83 to 85 W., sixth principal meridian.

Railroads: Chicago, Burlington & Quincy; Union Pacific; Chicago & North Western Colorado & Southern.

Railroad stations and estimated population, June 30, 1918: Bridgeport, 1,000; Bayard, 1,500; Minatare, 600; Scottsbluff, 6,000; Mitchell, 1,100; Morrill 600; Henry, 100; McGrew, 100; Melbeta, 100; Gering, 2,500; and Haig, Nebr., 100; Torrington, 1,000; Lingle, 150; Fort Laramie, 60; Guernsey, 400, and Caspar, Wyo., 6,000.

WATER SUPPLY.

Source of water supply: North Platte River.

Area of drainage basin: 12,000 square miles.

Annual run-off in acre-feet of North Platte River: At Pathfinder, Wyo. (12,000 square miles), 1906 to 1917, maximum, 2,420,000; minimum, 870,000; mean, 1,480,000. At Whalen, Wyo. (16,200 square miles), 1900 to 1917, maximum, 2,690,000; minimum, 983,000; mean, 1,624,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

INTERSTATE UNIT.

Area for which the service is prepared to supply water, season of 1918, 129,778 acres.

Area under water-right applications and rental contracts, season of 1917, 111,941 acres.

Length of irrigating season: From April 1 to September 30—183 days.

Average elevation of irrigable area: 4,100 feet above sea level.

Rainfall on irrigable area: 8 years average 14.04 inches; 1917, 11.75 inches.

Range of temperature on irrigable area:—30° to 104° F.

Character of soil of irrigable area: Sandy loam.

Principal products: Alfalfa, cereals, corn, sugar beets, and potatoes.

Principal markets: Omaha, Nebr.; Kansas City, and St. Joseph, Mo.; Denver, Colo. central Wyoming.

FORT LARAMIE, UNIT.

Area for which the service is prepared to supply water, season of 1918, 12,000 acres.

Area under rental contracts, season of 1918, 3,000 acres.

LANDS OPENED FOR IRRIGATION.

INTERSTATE UNIT.

Dates of public notices and orders: July 29, 1907; May 29, June 16, November 12, 1908; March 3, March 27, June 2, 1909; March 12, April 4, June 6, June 25, July 2, September 10, 1910; March 7, March 24, April 21, December 30, 1911; March 13, March 14, March 19, May 23, June 24, September 5, 1912; February 5, March 11 (2), March 29, June 16, June 23, July 13, September 4, 1913; September 24, 1914; February 27, April 23, 1915; January 13, February 10, February 24, March 16, May 16, 1916; March 16, March 22, 1917; April 3, 1918.

Location of lands opened: Ts. 21 to 26 N., Rs. 51 to 65 W., sixth principal meridian.
Limit of area of farm units: Public, 80 acres; private, 160 acres.
Duty of water: Two and one-half acre-feet per acre per annum at the farm.

Charges per acre of irrigable land: Building, $45 and $55; annual operation and maintenance, 50 cents per acre-foot for water used prior to June 20 and after August 31; $1 per acre-foot for water used subsequent to June 20 and before September 1, with a minimum charge of $1.50 per acre.

FORT LARAMIE UNIT.

Date of public order: March 12, 1918.
Location of lands opened: No lands opened.
Charges for rental water, 40 cents per acre-foot delivered at farm.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1902.
Construction recommended by director March 7, 1903.
Construction conditionally authorized by Secretary March 14, 1903.
First irrigation by Reclamation Service, season of 1908.
Whalen Diversion Dam completed February, 1909.
Pathfinder Dam completed June, 1909.
Pathfinder Dike completed May, 1911.
Interstate Canal, 165 miles completed June 30, 1914.
Pathfinder unit, 99.1 per cent completed June 30, 1918.
Interstate unit, 95 per cent completed June 30, 1918.
Fort Laramie unit, 30 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the North Platte project provides for the storage of flood waters of North Platte River in a reservoir controlled by the Pathfinder Dam, about 3 miles below the junction of the North Platte and Sweetwater Rivers and 50 miles southwest of Casper, Wyo., and in smaller reservoirs along the canal lines; and the diversion of water from North Platte River by a dam near Whalen, Wyo., into the Interstate Canal, supplying water for lands on the north side of the river and into the Fort Laramie Canal, watering lands on the south side of the river. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The completed features are: Pathfinder Reservoir; Whalen Diversion Dam; the first three divisions of the Interstate Canal; lateral systems of districts 1, 2, and 3 of the Interstate Canal system; Reservoir No. 1, known as Lake Alice; Reservoir No. 3 known as Lake Minatare. The Fort Laramie Canal system, covering approximately 100,000 acres, is now under construction.

SUMMARY OF GENERAL DATA FOR NORTH PLATTE (INTERSTATE) PROJECT TO END OF FISCAL YEAR, 1918.

Areas:[1]		
Irrigable acreage when project is complete		129, 778
Public land entered to end of fiscal year	82, 408	
Public land open to entry at end of fiscal year	80	
Public land withdrawn at end of fiscal year	610	
State land	5, 338	
Private land	41, 342	
Acreage service could have supplied season of 1917		129, 778
Estimated addition in fiscal year 1919		922
Estimated acreage service can supply July 1, 1919		130, 700
Acreage actually irrigated season of 1917		92, 553
Acreage cropped under irrigation season of 1917		90, 110

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[1] Including lands of North Platte Canal & Colonization Co.

Crops:[1]		
Value of irrigated crops, season of 1917		$3, 385, 060. 00
Value of irrigated crops, per acre cropped		$41. 92
Finances:		
Net construction cost to end of fiscal year		$9, 265, 319. 69
Per cent complete at end of fiscal year		95
Appropriated for entire project fiscal year 1919, total		$881, 000. 00
Allotment for construction fiscal year 1919		$292, 800. 00
Estimated per cent complete June 30, 1919		96
Proposed appropriation fiscal year 1920 for construction		$59, 000. 00
Estimated gross construction cost to June 30, 1920		$7, 492, 000. 00
Estimated per cent complete June 30, 1920		98
Announced construction charges per acre		$55. 00
Appropriation fiscal year 1918, entire project		[2] $1,305,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation—		
Disbursements	$836, 967. 03	
Transfers	100, 786. 01	
	$937, 753. 04	
Registered liabilities chargeable to 1918 appropriation	115, 322. 43	
Contract obligations wholly covered by 1918 appropriation	108, 332. 59	
Estimated engineering expenses on contract work wholly covered by 1918 appropriation	20, 662. 51	
		1, 182, 070. 57
Unencumbered balance July 1, 1918, entire project		122, 929. 43
Repayments:		
Value of construction water right contracts		$6, 748, 562. 00
Construction charges—		
Accrued to end of fiscal year		725, 183. 19
Collected to end of fiscal year		[3] 631, 448. 86
Uncollected at end of fiscal year		93, 734. 33
Operation and maintenance charges (public notice)—		
Accrued to end of fiscal year		617, 517. 23
Collected to end of fiscal year		[4] 565, 075. 45
Uncollected at end of fiscal year		52, 441. 78
Water rental charges—		
Accrued to end of fiscal year		31, 793. 84
Collected to end of fiscal year		31, 581. 24
Uncollected at end of fiscal year		212. 60
Drainage:		
Estimated acreage damaged by seepage to end of fiscal year		3, 500
Miles of drains built to end of fiscal year—		
Open	25. 6	
Closed	13. 2	
Total		38. 8
Estimated acreage protected by drains built to end of fiscal year		5, 300
Estimated acreage to be protected by authorized system		6, 500
Cost of drainage works to end of fiscal year		$232, 750. 21

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[1] Excluding lands of North Platte Canal & Colonization Co.
[2] Includes refunds authorized to be added to 1919 appropriation by sundry civil act of June 12, 1917.
[3] Includes $12,320.48 credit for existing works taken up on joint construction vouchers.

FORT LARAMIE UNIT.

Areas:		
Irrigable acreage when project is complete		100,000
Public land entered to end of fiscal year	25,695	
Public land withdrawn at end of fiscal year	34,473	
State land	7,176	
Private land	32,656	
Estimated acreage Service can supply in fiscal year 1918		12,000
Estimated addition in fiscal year 1919		8,000
Estimated acreage Service can supply July 1, 1919		20,000
Finances:		
Gross construction cost to end of fiscal year [1]		$2,216,745
Per cent complete at end of fiscal year		30
Appropriated for entire project fiscal year 1919, total		$881,000
Allotment for construction, fiscal year 1919		$269,000
Estimated per cent complete June 30, 1919		33
Proposed appropriation, fiscal year 1920, for construction		$565,000
Estimated gross construction cost to June 30, 1920		$3,051,000
Estimated per cent complete June 30, 1920		42

CONSTRUCTION DURING FISCAL YEAR

INTERSTATE UNIT.

The wasteway at mile 1.4 of the Interstate Canal was completed.

The construction of Winters Creek Lake was completed except some riprap which will be needed before the reservoir is developed to full capacity.

The 5-foot concrete siphon on lateral 27–M was completed.

A few small lateral extensions were built on various parts of the project.

The Spottedtail wasteway was enlarged.

Two watermaster's cottages were constructed and a machine shop was installed for the repair of equipment.

BRIDGEPORT UNIT.

Preliminary location surveys for the main canal and laterals were completed and an estimate of the cost of construction was made.

FORT LARAMIE UNIT.

The following work on main canal excavation was completed during the year.

On division 3, excavation, MacArthur Bros. finished schedule 1 July 25, 1917, which completed all earthwork on this division.

On division 4, excavation, Winston Bros. completed all work, schedules 1 to 6, on May 22, 1918.

On division 5 bids were opened on March 15, 1917, on 18½ miles of main canal excavation divided into five schedules. Schedules 1 to 4 were awarded to Winston Bros. who started work in January, 1918. These four schedules are now 31 per cent complete. Schedule 5, otherwise called the Springer Cut, was awarded to MacArthur Bros. It comprises 3 miles of heavy cut with a maximum of 55 feet and involves 1,100,000 cubic yards of material. Work was started on this schedule in August, 1917, and is 65 per cent complete.

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[1]

Gross cost, both units North Platte project	$9,357,010.70
Less construction revenue earnings	91,691.01
Net construction cost	9,265,319.69

On division 6 bids were opened on the one schedule comprising 5.7 miles of main canal excavation. This work was awarded to J. E. Hilton, who started work in July, 1917, and the contract is 95 per cent complete.

On division 7, main canal, from station 3570 to the Nebraska-Wyoming State line at station 4503, bids on excavation were first received September 5, 1917. These bids were rejected as being too high. Work was readvertised and bids were again received on December 17, 1917. These bids were also considered high and were rejected. It was then decided to contract only the necessary corebank construction, including all overhaul, and to complete the main excavation by Government forces with electric dragline machines operated from a hydroelectric power plant to be built 3 miles southwest of Lingle, Wyo., where 1,000 horsepower will be developed by dropping 100 second-feet of water from the Fort Laramie main canal approximately 110 feet to the power house. The electric power will be distributed by 60 miles of high-tension and 40 miles of low-tension transmission lines.

The necessary corebanks and overhaul were advertised and bids opened April 16, 1918. J. E. Hilton was awarded the entire four schedules and work was started in June, 1918.

Two Bucyrus drag-line machines were transferred from the Boise project and three new Bucyrus electric drag lines of 1½ yard capacity were purchased.

In addition to the excavation of the main canal, division 7, it is also proposed to use these electric drag lines for the excavation of several of the main laterals and drains on this unit.

Work on the forebay of the power plant was started in April, 1918, and is now nearly complete. Shipments of machinery for the power house have been delayed somewhat. Nearly all materials for the transmission lines have been received, and work is now progressing in their construction. It is expected to begin actual excavation by the electric drag lines during the fall of 1918.

On the main canal structures good progress was made both by contract and Government forces. The following features were completed during the year: Whalen sand trap, tunnels Nos. 1 and 2, Deer Creek and Dearing lateral siphons, 5 wasteways, 15 culverts, 12 bridges, and 31 turnouts.

The main canal, including all structures, is now completed from the headworks to mile 40. During the spring of 1918 priming operations were in progress on the first 30 miles and this work is still progressing.

On lateral excavation all work was nearly completed during the year on division 1, lateral system, which includes all irrigable land from the headworks of the main canal to and including the Cherry Creek lateral

On division 2, lateral system, which includes all irrigable land between the Springer Cut and the Nebraska-Wyoming State line, 10 schedules of lateral excavation have been awarded by field contracts, and work is now well under way. The surveys for irrigable areas and lateral locations on this division are now in progress.

On lateral structures all work has been completed to and including lateral 38.0, with the exception of the reinforced concrete siphon on lateral 35.4, which will be started soon.

SEEPAGE AND DRAINAGE.

INTERSTATE UNIT.

Surveys and investigations incident to design, location, and construction of drainage works were continued during the year. These investigations include borings over the affected areas and areas likely to become seeped to determine the subsoil conditions, the elevation and periodic variation of the water table, and other factors bearing on the location and construction of drainage works.

During the year work was continued on the Sheep Creek drain and 1.54 miles of additional open drain and 0.1 mile of additional closed drain were built.

On the Winters Creek drain 0.22 mile of open drain was converted into closed drain and 0.39 mile additional closed drain was built.

Work was begun on the Nine Mile drain and the lower Nine Mile drain, and 1.27 and 2.62 miles, respectively, of open drain were built.

FORT LARAMIE UNIT.

Drainage surveys have been made in Cherry Creek Valley in Wyoming, and under cooperative contract with the Gering irrigation district in the Gering Valley, in Nebraska.

OPERATION AND MAINTENANCE.

INTERSTATE UNIT.

The system as operated during the present season consisted of the Pathfinder Reservoir, the Whalen diversion dam, 95 miles of main canal, Lake Alice, 5 miles of Reservoir supply canal, Lake Minatare, Winters Creek Lake, 37 miles of high-line canal, 42 miles of low-line canal, and 626 miles of laterals.

In 1917 water to the amount of 177,472 acre-feet was delivered to 1,274 farms, containing approximately 83,203 acres in crop, exclusive of the lands of the North Platte Canal & Colonization Co., to which 44,534 acre-feet of water were delivered for the irrigation of 105 farms, containing approximately 9,350 acres in crop. The average amount of water used upon the land under the interstate unit was 2.13 acre-feet per acre and upon the land of the North Platte Canal & Colonization Co. 4.77 acre-feet per acre. The total diversion at the Whalen Dam during the irrigation season of 1917 was 425,078 acre-feet.

During the first part of the season of 1918, 104,026 acres were entitled to water under water-right application and 17,837 acres under contract with the North Platte Canal & Colonization Co. Of this amount approximately 98,754 acres were under cultivation.

Water was diverted into the Interstate Canal on April 10, 1918, and the maximum diversion to June 30 was 1,610 second-feet. On account of the heavy precipitation most of the water diverted was stored in Lakes Alice and Minatare up to May 20. Water was delivered on demand up to June 13 and on rotation thereafter.

The storage in Pathfinder Reservoir was 1,176,650 acre-feet on July 1, 1917, decreasing to 619,290 acre-feet on October 20, 1917, increasing to 1,122,430 acre-feet on June 24, 1918, and decreasing to 1,107,580 acre-feet on June 30, 1918. On June 24 water was running over the spillway with a depth of 2.33 feet.

FORT LARAMIE UNIT.

Water was first turned into the Fort Laramie Canal for priming on March 27, 1918, and the diversion was gradually increased to 225 second-feet at the end of June. The first water was delivered for irrigation on June 22. Water is being delivered during the season of 1918 on a rental basis only. About 3,000 acres of vacant irrigable land were leased for farming purposes to the Liberty wheat growers, of Torrington, Wyo.

Historical review, North Platte project.

Item.	1913	1914	1915	1916	1917	1918
Acreage for which service was prepared to supply water	[1] 109,272	[1] 109,341	[1] 129,684	[1] 129,891	[1] 129,891	[1] 129,778
Acreage irrigated	[1] 63,366	[1] 67,700	[1] 78,057	84,208	[1] 92,553	[1] 98,754
Miles of canal operated	648	652	800	800	805	805
Water delivered to land (acre-feet)	[2] 141,489	[2] 176,915	[2] 96,467	[2] 164,240	[2] 177,472	....
Per acre of land irrigated (acre-fet)	[2] 2.49	[2] 2.92	[2] 1.38	[2] 2.17	[2] 2.13	....

[1] Includes North Platte Canal & Colonization Co. lands.

[2] Exclusive of lands under North Platte Canal & Colonization Co. tract.

SETTLEMENT.

Conditions on the project continued to improve during the year, due principally to prevalent high prices for all farm products and excellent market conditions. Crop yields per acre were about normal, being rather high for potatoes and rather low for alfalfa. The number of land transfers has been about normal. There is now only one farm unit on the interstate unit open for entry; no land on the Fort Laramie unit has been opened. Profits from feeding stock were less than in the two years previous. There is some hog cholera on the project, but it is well under control. The grade of cattle on the project has improved somewhat.

Settlement data, North Platte project.

Item.	1914	1915	1916	1917	1918
Total number of farms on project	1,270	1,456	1,467	[1] 1,406	[1] 1,406
Population	3,800	4,000	4,200	[1] 4,500	[1] 4,500
Number of irrigated farms	944	1,095	1,189	1,274	[1] 1,274
Operated by owners or managers	567	682	721	810	[1] 774
Operated by tenants	377	413	468	464	[1] 500
Population	3,290	3,828	3,942	4,056	[1] 4,200
Number of towns	7	7	7	7	8
Population	4,900	5,000	5,500	[1] 8,000	[1] 11,000
Total population in towns and on farms	8,700	9,000	9,700	[1] 12,500	[1] 15,500
Number of public schools	34	34	34	40	40
Number of churches	25	25	25	25	25
Number of banks	14	15	16	16	16
Total capital stock	$302,000	$317,000	$352,000	$352,000	$352,000
Amount of deposits	$1,704,000	$1,710,000	$1,800 000	[1] $2,400,000	[1] $2,600,000
Number of depositors	....	5,700	6,000	[1] 7,000	7,200

[1] Estimated.

PRINCIPAL CROPS.

The cropped area has continued to increase, until in 1918 it is estimated to amount to 98,754 acres, including the North Platte Canal & Colonization Co.'s lands. Of this amount about 48 per cent is in alfalfa, 32 in cereals, 7 in sugar beets, 8 in potatoes, and the remaining 5 per cent in miscellaneous crops. The total value of the crops on the interstate unit for the year 1917 was $3,385,060, with an average value of $41.92 per acre, as compared with a total value of $1,633,390 and an average value of $21.85 per acre in 1916. Increased values per acre were most pronounced in the case of alfalfa, barley, corn, and wheat. Hot weather in June has accelerated the crop in 1918 and the indications are that crop yields will be better than average. The first cutting of alfalfa was unusually good.

Crop report, North Platte project (Interstate unit), Nebraska-Wyoming, year of 1917.[1]

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	34,374	Ton	58,656	1.7	$17.00	$997,152	$29.00
Alfalfa seed	40	Bushel	51	1.3	10.00	510	12.75
Barley	3,052	...do	94,868	31.0	1.20	113,842	37.30
Beans	2,304	...do	14,224	6.2	6.00	85,344	37.04
Beets, sugar and tops	9,357	Ton	99,790	10.7	7.50	748,425	79.99
Beets, stock	42	...do	444	10.6	5.00	2,220	52.85
Cabbage	12	...do	60	5.0	20.00	1,200	100.00
Corn	6,051	Bushel	117,008	19.3	1.50	175,512	29.01
Corn fodder	763	Ton	1,191	1.6	2.00	2,382	3.12
Garden	254					25,400	100.00
Hay (other)	1,015	Ton	853	.8	12.00	10,236	10.08
Millet seed	309	Bushel	2,799	9.0	1.50	4,200	13.59
Oats	10,173	...do	243,764	24.0	.70	170,635	16.77
Onions	17	...do	1,695	100.0	2.25	3,814	224.34
Pasture, alfalfa	3,116					46,740	15.00
Pasture, other	830					4,150	5.00
Potatoes	4,833	Bushel	1,119,626	231.7	.80	895,700	185.33
Rye	471	...do	3,434	7.3	1.50	5,151	10.94
Squash	25	Ton	151	6.0	15.00	2,265	90.60
Wheat	3,128	Bushel	47,467	15.2	1.80	85,440	27.31
Miscellaneous	594					4,742	7.98
Total cropped	80,760	Total and average				3,385,060	41.92

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Irrigable area farms reported	102,745	1,274	92
Alfalfa seeding with nurse crop.	6,503	Irrigated area farms reported	83,203	1,274	74
		Under water right applications.	82,523	1,264	73
Alfalfa seeding without nurse crop.	1,777	Under rental contracts	680	10	1
		Cropped area farms reported	80,760	1,274	72
Fall seeding (wheat)	666				
Less duplicated area	6,503				
Total irrigated	83,203				

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[1] Exclusive of North Platte Canal and Colonization Co. lands.

SALE OF SUPPLEMENTAL STORAGE RIGHTS FROM PATHFINDER RESERVOIR TO PRIVATE LANDS.

In accordance with plans outlined in previous reports contract with the Lincoln Land Co. for the purchase of supplemental storage rights has been approved by the Secretary of the Interior.

The hydraulic studies mentioned in the thirteenth, fourteenth, fifteenth, and sixteenth annual reports are being continued by a competent hydrographer, and in cooperation with the State of Nebraska, for the purpose of determining losses in transmission and accessions from tributaries, and obtaining such other information as will aid in a determination of water rights and proper water distribution.

PUBLIC NOTICES AND ORDERS.

WATER-RENTAL ORDER, MARCH 12, 1918.

1. **Lands for which water is available.**—In pursuance of the reclamation act of June 17, 1902 (32 Stat., 388) and acts amendatory thereof or supplementary thereto, particularly section 11 of the reclamation extension act of August 13, 1914 (38 Stat., 686), it is announced that water is available for certain irrigable lands under the Fort Laramie Canal, North Platte project, Nebraska-Wyoming, for which laterals are now or may be constructed. These lands are located between the North Platte River and the Fort Laramie Canal and above Cherry Creek, in Wyoming.

2. **Rental of water.**—The charge for rental of water for irrigation of said lands is 40 cents per acre-foot measured at the land, and is due and payable on December 1 following the irrigation season. Applications for water service must be made to the project manager, Mitchell, Nebr. The renting of water shall in no event constitute or be construed to be the basis of a permanent water-right from said project.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, APRIL 3, 1918.

1. **Annual operation and maintenance charges**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charges for the irrigation season of 1918 and thereafter until further notice against all lands of the North Platte project, Nebraska-Wyoming, under public notice, shall be as follows: A minimum charge of $1.50 per irrigable acre will be made whether water is used thereon or not. For all water delivered prior to and including June 20 a charge will be made of 50 cents per acre-foot; for all water delivered between June 21 and August 31, inclusive, a charge will be made of $1 per acre-foot; and for water delivered on and from September 1 to the end of the season a charge will be made of 50 cents per acre-foot. The minimum charge of $1.50 will be applied in payment of the charges under the said acre-foot rates. All operation and maintenance charges will be due and payable on March 1 of each year for the preceding irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15, or where water-right application is made after August 1 for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

E. C. BRADLEY,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, North Platte project, June 30, 1918.

Cash			$8,043.58
Inventory of stock on hand			313,911.83
Accounts receivable			6,176,512.61
Construction work contracted			389,695.87
Construction cost		$9,357,010.70	
Less construction revenue earnings	$85,091.58		
Less cost adjustments	6,599.43		
		91,691.01	
			9,265,319.69
Operation and maintenance cost			758,160.63
Total			16,911,644.21
Accounts payable			220,634.64
Contingent obligations			397,725.56
Reserves for repayment to reclamation fund of cost of project			7,398,928.14
Capital investment:			
Disbursement, transfer, and joint construction vouchers received		$10,308,988.84	
Collection, transfer, refund, and joint construction vouchers issued		1,414,632.97	
Net investment			8,894,355.87
Total			16,911,644.21

Feature costs of North Platte project to June 30, 1918.

INTERSTATE UNIT.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and survey:		
Secondary projects		$51,531.40
Water-right adjudication		9,473.39
Northport district	$2,189.00	4,183.30
Total	2,189.00	65,188.09
Storage system:		
Pathfinder		1,824,042.64
Lake Alice		209,730.19
Lake Minatare	3,191.69	557,586.41
Winter Creek Lake	3,024.45	7,081.29
Total	6,216.14	2,598,440.53
Canal system:		
Whalen diversion dam		235,010.54
First division interstate canal	2,623.39	1,041,496.95
Second division interstate canal		849,340.29
Third division interstate canal		447,004.84
Total	2,623.39	2,572,852.62
Lateral system:		
Rawhide		3,819.31
Lateral district No. 1		359,892.21
Lateral district No. 2	265.75	285,300.54
Lateral district No. 3	7,697.73	296,007.39
	7,963.48	945,019.45
Drainage system:		
Drainage investigations	1,054.37	18,789.02
Open drains—		
Alliance drain		12,680.87
Stewart drain		7,723.82
Sheep Creek drain	8,425.75	27,464.74
Morrill drain		5,110.00
Dunham drain		1,600.32
Banner drain		2,681.90
Hiersche drain		15,022.43
Akers draw		192.02
Winter Creek drain	220.07	1,113.84
Nine Mile	4,218.73	4,245.96
Nine Mile drain below Tri State	17,999.90	17,999.90
Wild Horse	559.22	559.22
Diversion ditches		4,584.88
Subtotal of open drains	31,423.67	100,979.90

Feature costs of North Platte project to June 30, 1918—Continued.

INTERSTATE UNIT—continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Drainage system—Continued.		
Closed drains—		
Winter Creek drain	$10,453.35	$18,539.90
Sheep Creek drain	1,013.12	19,143.37
Dunham drain		31,614.96
McAllister drain		21,367.35
Sunflower drain		16,597.70
Banner drain		4,449.00
Hiersche drain		1,269.01
Subtotal of closed drains	11,466.47	112,981.29
Total of drainage system	43,944.51	232,750.21
Farm units		43,003.29
Permanent improvement and lands:		
Buildings at Mitchell	926.86	13,644.86
Buildings at Pathfinder		5,000.00
Buildings at Wyncote		4,395.00
Cottage at Dutch Flats	[1] 286.40	958.15
Cottage at Sunflower	12.50	941.97
Cottage at Minatare	845.62	1,845.62
Buildings at Sheep Creek	2,578.08	2,578.08
Buildings at Whalen		1,435.65
Cottage at Lake Alice		750.00
Experimental farm buildings		5,272.18
Lands, right of way, and damage claims		26,798.34
Total	4,076.66	63,619.85
Operation and maintenance during construction		428,457.18
Accrued and unpaid operating and maintenance transferred to construction	724.70	82,072.95
Balance in plant accounts	36,770.55	108,862.01
Clearing accounts	[1] 35,206.59	
Subtotal—Gross cost of the interstate unit to June 30, 1918	69,301.84	7,140,266.18

[1] Deduct.

FORT LARAMIE UNIT.

Examination and survey:		
By project manager		$23,985.47
By construction engineer	[1] $1,137.35	
Guernsey storage reservoir	812.82	2,554.24
Total	[1] 324.53	26,539.71
Canal system:		
Surveys	7,221.22	40,766.22
Whalen Dam and headworks	6,630.41	24,862.16
Tunnel No. 1	22,853.76	165,042.41
Tunnel No. 2	62,046.27	147,975.65
Earthwork	483,640.82	1,101,938.59
Concrete lining	[1] 1,072.50	14,668.69
Protecting canal banks	13,698.66	24,163.51
Minor structures	[1] 3,696.28	954.88
Laramie River siphon	1,510.83	32,815.20
Deer Creek siphon	9,237.61	29,309.33
Siphon, station 519		1,313.74
Culvert—		
Station 611		1,073.46
Station 561		7,853.62
Station 767		8,697.54
Station 916		7,929.17
Station 640		1,677.49
Station 850		2,005.08
Station 1235	647.84	3,297.61
Station 988		674.00
Station 1009	952.29	2,796.66

Feature costs of North Platte project to June 30, 1918—Continued.

FORT LARAMIE UNIT—Continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Canal system—Continued.		
Road along main canal	$986.35	$986.35
Farm bridge—		
Station 433	240.32	1,339.96
Station 640	448.22	1,165.95
Wasteway—		
Station 171	13,034.63	13,262.75
Station 473	12,707.44	14,753.30
Station 715	17,567.86	18,018.23
Station 1337	6,960.85	6,960.85
Station 2106	5,482.12	5,482.12
Nietfelt concrete siphon	95.73	3,537.46
Nietfelt pipe siphon		902.82
Horse Creek siphon		205.00
Farm bridge, station 101	[1] 24.53	1,134.93
Concrete culvert—		
Station 1446	3,526.75	3,526.75
Station 1495	4,234.79	10,422.34
Station 1568	5,859.34	5,859.34
Station 1664	3,281.74	3,281.74
Station 1751	2,440.52	2,440.52
Pipe culvert—		
Station 1667	786.17	786.17
Station 1720	756.62	756.62
Station 1815	126.33	566.33
Station 1842	39.32	621.73
Concrete culvert—		
Station 1948	1,668.56	1,668.56
Station 1970	1,794.00	1,794.00
Station 2019	2,639.86	2,639.86
Station 2072	2,072.15	2,072.15
Station 2145	2,568.01	2,568.01
Station 2216	1,882.34	1,882.34
Bridge—		
Station 343	413.10	2,549.74
Station 485	2,865.81	2,865.81
Station 569	2,813.08	2,813.08
Paving		416.83
Bridge—		
Station 804	2,966.50	2,966.50
Station 995	2,705.32	2,705.32
Station 1057	2,682.97	2,682.97
Station 1245	2,689.57	2,689.57
Station 1376	2,522.60	2,522.60
Station 1590	2,734.76	2,734.76
Station 1849	1,729.54	1,729.54
Station 2095	1,432.88	1,432.88
Station 2255	1,419.05	1,419.05
Concrete culvert—		
Station 2312	2,458.00	2,458.00
Station 2107	1,069.37	1,069.37
Sand trap at Whalen Dam	6,041.80	6,041.80
Pipe culvert—		
Station 90	734.91	734.91
Station 135	828.50	828.50
Station 310	928.72	928.72
Station 383	757.67	757.67
Station 665	728.39	728.39
Station 692	708.82	708.82
Canal turnout—		
Mile 12.7	1,050.59	1,050.59
Mile 15.2	934.05	934.05
Mile 16.9	803.55	803.55
Mile 17.8	998.52	998.52
Mile 19.1	1,071.01	1,071.01
Mile 21.1	1,057.72	1,057.72
Mile 22.8	917.40	917.40
Mile 23.6	771.55	771.55
Mile 26.8	739.96	739.96
Mile 28.8	648.77	648.77
Mile 29.4	946.27	946.27
Mile 30.1	921.19	921.19
Mile 31.2	934.49	934.49
Mile 31.8	780.05	780.05
Mile 32.4	758.97	758.97

[1] Deduct.

Feature costs of North Platte project to June 30, 1918—Continued.

FORT LARAMIE UNIT—Continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1818.
Canal system—Continued.		
Canal right of way to State line	$3,047.95	$3,047.95
Canal turnout—		
Mile 32.9	745.28	745.28
Mile 33.5	1,006.53	1,006.53
Mile 34.1	1,026.94	1,026.94
Mile 34.8	844.64	844.64
Mile 35.4	1,079.03	1,079.03
Mile 35.7	735.70	735.70
Mile 36.4	607.40	607.40
Mile 37.2	654.14	654.14
Mile 38.0	483.35	483.35
Mile 38.5	366.15	366.15
Mile 39.7	499.14	499.14
Deering lateral siphon	3,991.29	3,991.29
Priming main canal	10,008.84	10,008.84
Barnes bridge	1,749.59	1,749.59
Total	776,257.84	1,812,416.08
Lateral system:		
Surveys	63,328.56	79,741.86
Earthwork, lateral 12.7 to 23.3	3,659.47	6,627.57
Minor structures, lateral 12.7 to 23.3	16,896.41	17,412.83
Earthwork, lateral 26.7 to 35.4	13,464.06	13,464.06
Minor structures, lateral 26.7 to 35.4	19,083.51	19,083.51
Earthwork, lateral 35.7 to 45.1	10,605.37	10,605.37
Minor structures, lateral 35.7 to 45.1	18,451.05	18,451.05
Earthwork, Cherry Creek and sublaterals	30,549.18	30,549.18
Minor structures, Cherry Creek and sublaterals	929.86	929.86
Siphon on lateral 35.4	1,787.69	1,787.69
Earthwork, Springer Cut to State line	5,372.66	5,372.66
Total	184,127.82	204,025.64
Drainage system:		
Investigations in Wyoming	1,531.49	1,531.49
Investigations in Gering Valley	1,462.82	1,462.82
Total	2,994.31	2,994.31
Farm units:		
Surveys	5,414.20	6,122.72
Fencing	1,818.41	1,818.41
Total	7,232.61	7,941.13
Permanent improvements and lands:		
Roads	[1] 59.30	....
Bridges	[1] 1,749.59	....
Cottages, Box Elder	346.72	346.72
Cottages, Fairview camp	1,555.77	1,555.77
Buildings, Kiowa camp	6,347.82	6,347.82
Cottages, Kiowa camp	1,538.78	1,538.78
Total	7,980.20	9,789.09
Telephone system: Pole line	15,106.18	15,106.18
Balance in plant accounts	82,039.24	137,932.38
Subtotal, gross cost of the Fort Laramie unit to June 30, 1918	1,075,413.67	2,216,744.52
Total gross cost of entire project to June 30, 1918	1,144,715.51	9,357,010.70
Less revenues earned during construction period:		
Rentals of buildings	183.20	6,647.55
Rental of grazing and farming lands	14,453.44	25,000.17
Rentals of irrigation water	....	17,736.30
Contractors' freight refunds	3,340.81	34,307.57
Other revenues, unclassified	[1] 514.54	1,399.99
Profit on hospital operations	105.53	6,599.43
Total revenues to June 30, 1918	17,568.44	91,691.01
Net cost to June 30, 1918	....	9,265,319.69

[1] Deduct.

Statement of cost by calendar years, North Platte project.

Year ending Dec. 31—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total, operation and maintenance.	
1904	$95,000.00				$95,000.00
1905	692,795.80				692,795.80
1906	1,219,052.96				1,219,052.96
1907	961,096.48	$2,408.39		$2,408.39	963,504.87
1908	614,953.87	8,486.18		8,486.18	623,440.05
1909	475,899.91	63,353.75		63,353.75	539,253.66
1910	448,638.71	173,660.95	$50,697.30	224,358.25	672,996.96
1911	416,951.93	135,303.36	63,062.13	198,365.49	615,317.42
1912	355,625.45	11,587.00	65,791.53	77,378.53	433,003.98
1913	397,426.87	12,250.75	74,442.49	86,693.24	484,120.11
1914	434,328.31	16,250.00	84,026.75	100,276.75	534,605.06
1915	324,067.45	5,156.80	114,850.00	120,006.80	444,074.25
1916	644,736.59		119,693.74	119,693.74	764,430.33
1917	984,813.96		149,994.80	149,994.80	1,134,808.76
January to June 30, 1918	534,297.89		130,700.47	130,700.47	664,998.36
Unpaid operation and maintenance charges added to construotion on June 30, 1918	82,072.95		[1] 82,072.95	[1] 82,072.95	
Plant accounts on June 30, 1918	246,794.39				246,794.39
Total	8,928,553.52	428,457.18	771,186.26	1,199,643.44	10,128,196.96

[1] Deduct.

Statement of cost by fiscal years, North Platte project.

Year ending June 30—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total, operation and maintenance.	
1905	$190,000.00				$190,000.00
1906	1,195,591.61	$2,408.39		$2,408.39	1,198,000.00
1907	1,242,513.82	8,486.18		8,486.18	1,251,000.00
1908	679,680.98	63,353.75		63,353.75	743,034.73
1909	550,226.76	173,660.95		173,660.95	723,887.71
1910	401,573.07	135,303.36		135,303.36	536,876.43
1911	495,704.37	11,587.00	$101,394.61	112,981.61	608,685.98
1912	338,198.89	12,250.75	64,729.66	76,980.41	415,179.30
1913	373,052.00	16,250.00	66,853.40	83,103.40	456,155.40
1914	421,780.94	5,156.80	82,031.58	87,188.38	508,969.32
1915	446,895.69		86,021.92	86,021.92	532,917.61
1916	348,531.53		108,423.94	108,423.94	456,955.47
1917	855,548.91		115,514.49	115,514.49	971,063.40
1918	1,144,715.51		227,564.91	227,564.91	1,372,280.42
Unpaid operation and maintenance charges added to construction on June 30, 1917	81,348.25		[1] 81,348.25	[1] 81,348.25	
Plant and undistributed clearing accounts on June 30, 1917	163,191.19				163,191.19
Total	8,928,553.52	428,457.18	771,186.26	1,199,643.44	10,128,196.96

[1] Deduct.

Estimated cost of contemplated work, North Platte project, during fiscal year 1919.

	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Storage system:		
Horse Creek Reservoir surveys	$2,000	
Pathfinder Reservoir outlet	58,000	
		$60,000
Canal system:		
Division 7, Fort Laramie Canal	50,000	
Cherry Creek wasteway	35,000	
Northport Canal	150,000	
		235,000
Lateral system:		
Extension-Interstate	2,000	
Earthwork, Springer, and Horse Creek system (Fort Laramie)	94,000	
Structures, Cherry Creek and Springer (Fort Laramie)	35,000	
Earthwork, Indian Creek system—Northport	15,000	
Structures, Indian Creek system—Northport	10,800	
		156,800
Drainage system:		
Open drain, interstate	30,000	
Closed drain, interstate	10,000	
		40,000
Farm-unit survey, Fort Laramie		10,000
Permanent improvement:		
Building, interstate	5,000	
Building, Fort Laramie	5,000	
		10,000
Telephone system, Fort Laramie		5,000
Operation and maintenance:		
Water rental, Fort Laramie		25,000
Public notice, interstate		200,000
Total		741,800

Operating expenses and revenues, North Platte project, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works:						
Pathfinder Reservoir	$8,250.22	$940.80	$9,191.02			
Lake Alice		334.76	334.76			
Lake Minatare	6,808.50	5,274.81	12,083.31			
Gaging North Platte River	3,388.93		3,388.93	$46,410.57	$13,335.89	$59,746.46
	18,447.65	6,550.37	24,998.02	46,410.57	13,335.89	59,746.46
Canal system:						
Whalen diversion dam	4,119.70	608.79	4,728.49			
First division main canal	17,286.00	28,962.53	46,248.53	109,213.48	192,118.13	301,331.61
Second division main canal	7,642.99	23,281.88	30,924.87			
	29,048.69	52,853.20	81,901.89	109,213.48	192,118.13	301,331.61
Lateral system:						
Rawhide, first and second lateral districts	16,709.28	51,461.84	68,171.12			
Third lateral district	11,697.92	37,169.98	48,867.90	209,331.42	265,298.34	474,629.76
	28,407.20	88,631.82	117,039.02	209,331.42	265,298.34	474,629.76
Drainage system:						
Open drains—						
Alliance drain		2,426.88	2,426.88			
Stewart drain		245.71	245.71			
Sheep Creek drain		197.43	197.43	375.40	15,425.53	15,800.93
Hiersche drain		187.27	187.27			
Subtotal		3,057.29	3,057.29	375.40	15,425.53	15,800.93
Closed drains—						
Dunham drain		54.75	54.75			
McAllister drain		144.08	144.08			
Sunflower drain		27.55	27.55			
Banner drain		12.37	12.37			
Subtotal		238.75	238.75			
Total drainage system		3,296.04	3,296.04	375.40	15,425.53	15,800,92
Undistributed expenses	[1] 58.68		[1] 58.68			
Experimental investigations				2,475.15	[1] 724.70	1,750.45
Crop reports	1,113.32		1,113.32			
	1,054.64		1,054.64	2,475.15	[1] 724.70	1,750.45
Subtotal	76,958.18	151,331.43	228,289.61	367,806.02	485,453.19	853,259.21
Less operation and maintenance transferred to construction			[1] 724.70			[1] 82,072.95
Total entire project	76,958.18	151,331.43	227,564.91	367,806.02	485,453.19	771,186.26

[1] Deduct.

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$137,467.05	$617,517.23
Operation and maintenance charges paid in advance by water-right applicants	453.60	491.26
Operation and maintenance charges paid and forfeited by water-right applicants	28.00	1,191.95
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	1,698.93	3,851.34
Rentals of irrigation water	926.49	14,057.54
Loss on farming operations	[1] 1,031.91	[1] 1,031.91
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants	[1] 3,663.89	[1] 8,838.40
Total	135,878.27	627,239.01
Difference (deficit)	91,686.64	143,947.25

[1] Deduct.

NEVADA, TRUCKEE-CARSON PROJECT.

JOHN F. RICHARDSON, project manager, Fallon, Nev.[1]

LOCATION.

Counties: Churchill, Storey, and Lyon.

Townships: 17 and 18 N., Rs. 17 to 30 E.; 19 N., Rs. 26 to 31 E.; 20 N., Rs. 22 to 31 E., Mount Diablo meridian.

Railroad: Southern Pacific.

Railroad stations and estimated population, June 30, 1918: Fernley, 40; Hazen, 100; Fallon, 1,700; Stillwater, 20.

WATER SUPPLY.

Source of water supply: Truckee and Carson Rivers.

Area of drainage basin: 3,450 square miles.

Annual run-off in acre-feet: Truckee River at Tahoe (519 square miles), 1901 to 1917, maximum, 704,000; minimum, 113,000; mean, 278,100. Truckee River near Derby (1,740 square miles), 1900 to 1917, maximum, 1,435,000; minimum, 356,000; mean, 864,670. Carson River at Empire (988 square miles), 1901 to 1917, maximum, 731,000; minimum, 172,000; mean, 428,100.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season 1918: 71,817 acres.

Area under water-right applications and rental contracts, season 1918: 51,515 acres.

Length of irrigation season: From April 1 to October 15, 198 days.

Average elevation of irrigable area: 4,000 feet above sea level.

Rainfall on irrigable area: Average 4 inches (maximum record 1913, 8.08 inches).

Range of temperature on irrigable area: —20° to 100° F.

Character of soil of irrigable area: Exceedingly variable; sand, sandy loam, adobe, clay, and volcanic ash.

Principal products: Alfalfa, small grain, potatoes, onions, sugar beets, truck crops, and dairy products.

Principal markets: Nevada and Pacific coast communities.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: May 6, November 1, 1907; January 30, April 4, June 5, December 26, 1908; March 1, September 28, 1909; April 26, September 16, 1910; April 22, October 17, 1911; February 8, June 13, 1912; January 17, June 23, July 15, July 21, 1913; August 19, December 16, 1914; January 30, February 26, March 20, May 13, November 12, 1915; January 17, February 11, 1916; March 10, March 22, July 16, July 31, October 30, 1917; January 2, January 15, April 3, April 10, May 7, May 20, 1918.

Location of lands opened: Ts. 17 to 20 N., Rs. 23 to 31 E., Mount Diablo meridian.

Limit of area of farm units: 40 to 160 acres.

Duty of water: 3.14 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable lands: $22, $30, $60, $65, and $115 (for Carson Lake leveled lands).

Annual operation and maintenance charge per acre of irrigable land: Fernley district, approximately $2.15 per acre; Fallon district, approximately $1.15 per acre, based on cost of service.

CHRONOLOGICAL SUMMARY.

Reconnaissance made and preliminary surveys begun in 1902.

Construction recommended by director, March 7, 1903.

Construction conditionally authorized by Secretary, March 14, 1903.

Truckee Canal completed June, 1905.

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[1] John T. Whistler was project manager from July 1 to Nov. 19, 1917.

Carson River headworks and main distributing canals completed September, 1905.
First irrigation by Reclamation Service season of 1906.
Truckee Canal chute completed November, 1910.
Lahontan Dam commenced January, 1911.
Lahontan Dam completed June, 1915.
United States took possession of outlet works at Lake Tahoe and assumed control July 1, 1915.
Entire project 53.8 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Truckee-Carson project provides for the storage of water on the headwaters of Truckee River, in Lake Tahoe, in the Alkali Flat Reservoir, near Churchill, Nev., and in Lahontan Reservoir on Carson River; the diversion of water from Truckee River by a dam about 20 miles below Reno, Nev., into the Truckee Canal, supplying water to lands in the Truckee and Carson River valleys and to the Lahontan Reservoir; the diversion of water from Carson River by a dam near Dayton, Nev., for storage in Alkali Flat Reservoir and irrigating lands in Churchill Valley below that reservoir; and the diversion of water from Carson River by a dam about 5 miles below the Lahontan storage dam into two canal systems, one on either side of the river, watering lands in the lower Carson River Valley. The United States claims all waste, seepage, unappropriated spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The features of the above irrigation plan which have been completed are: The dam at the outlet of Lake Tahoe, including the greater portion of the accessory dredging of the Truckee River Channel; the diversion dam in Truckee River near Derby, Nev., the Truckee Canal carrying water from this diversion 31 miles to the terminal concrete chute discharging into the Lahontan Reservoir; the forebay for the hydroelectric plant discharging Truckee Canal water into Carson River below Lahontan Dam; the diversion dam in Carson River situated about 5 miles below Lahontan Dam; that portion of the irrigation system which includes laterals taken out of Truckee Canal in the vicinity of Fernley and Hazen; and the two main canals heading at Carson diversion dam and extending over the main portions of the project in Carson sink, with Fallon as a center.

Construction of Lahontan Dam and Reservoir was completed in June, 1915, for the conservation of the flood waters in both the Truckee and Carson Rivers.

The features remaining for future construction are: The Alkali Flat Reservoir, or equivalent reservoirs in the upper Carson Valley, as may later be determined; the upper Truckee storage reservoirs as required; the extension of the irrigation system to cover additional irrigable areas adjacent to and on all sides of the project as already constructed; and the extension of the drainage system which may become necessary as supplemental construction in behalf of the water users under the provisions of the reclamation extension act.

SUMMARY OF GENERAL DATA FOR TRUCKEE-CARSON PROJECT TO END OF FISCAL YEAR 1918.

Areas:		
Irrigable acreage when project is complete		206 000
Public land entered to end of fiscal year	21,743	
Public land open to entry at end of fiscal year	4,304	
Public land withdrawn at end of fiscal year	96,663	
State land	120	
Indian land	5,450	
Private land	77,720	
Acreage service could have supplied season of 1917		71,817
Addition in fiscal year 1918		902
Estimated addition in fiscal year 1919		3,000
Estimated acreage service can supply July 1, 1919		75,719
Acreage actually irrigated, season of 1917		40,392
Acreage cropped under irrigation season of 1917		39,236
Crops:		
Value of irrigated crops, season of 1917		$1,450,480.00
Value of irrigated crops per acre cropped		$51.36

Finances:

Net construction cost to end of fiscal year	$6,199,459.34
Per cent complete at end of fiscal year	53.8
Appropriated for fiscal year 1919, total	$671,000.00
Allotment for construction. fiscal year 1919	$463,000.00
Estimated per cent complete, June 30, 1919	59.7
Proposed appropriation fiscal year 1920, for construction	$232,000.00
Estimated gross construction cost to June 30, 1920	$6,966,000.00
Estimated per cent complete, June 30, 1920	62
Announced construction charges per acre	$22, $30, $60, $65, $115

Appropriation, fiscal year 1918			$795,000.00
Expenditures during fiscal year chargeable to 1918 appropriation—			
Disbursements	$269,387.12		
Transfers	18,421.10		
		$287,808.22	
Registered liabilities chargeable to 1918 appropriation		29,668.32	
Contract obligations wholly covered by 1918 appropriation		9,606.95	
			327,083.49
Unincumbered balance, July 1, 1918			467,916.51

Repayments:

Value of construction water right contracts	1,188,920.33
Construction charges—	
Accrued to end of fiscal year	338,481.52
Collected to end of fiscal year	[1] 333,264.40
Uncollected at end of fiscal year	5,217.12
Operation and maintenance charges (public notices)—	
Accrued to end of fiscal year	299,427.37
Collected to end of fiscal year	[2] 289,318.20
Uncollected at end of fiscal year	10,109.17
Water-rental charges—	
Accrued to end of fiscal year	8,281.70
Collected to end of fiscal year	8,123.70
Uncollected at end of fiscal year	158.00
Power earnings—	
Accrued to end of fiscal year	8,617.81
Collected to end of fiscal year	8,580.86
Uncollected at end of fiscal year	36.95

Drainage:

Estimated acreage damaged by seepage to end of fiscal year		11,500
Miles of drains built to end of fiscal year—		
Open	14.23	
Closed	3.99	
Total		18.22
Estimated acreage protected by drains built to end of fiscal year.		15,000
Estimated acreage to be protected by authorized system		19,500
Cost of drainage works to end of fiscal year		$327,239.23

CONSTRUCTION DURING FISCAL YEAR.

Lateral construction.—Under this feature the largest item of construction during the year consisted in the excavation and installation of structures for the J, J_A, J_1, J_{1A}, and J_2 laterals and the J_1, J_{1A}, J_{1B}, and J_{1C} waste-water ditches or shallow drains. This work involved the moving of 21,700 cubic yards of material in these laterals in a length of 17,380 feet and of 16,950 cubic yards in the waste-water ditches in a length of 23,703 feet. Surveys and actual construction of these laterals and ditches were started during September, 1917, and were completed, including placing of structures, during January, 1917. This work was done to provide for the irrigation of lands in sections 35 and 36, T. 18 N., R. 29 E., Mount Diablo meridian, north of Carson Lake, leveled by the Government in advance of settlement. Construction was accomplished by the use of teams.

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[1] Includes $5,436.50 of work taken up on joint construction vouchers.

[2] Includes $6,158.36 of work taken up on joint construction vouchers.

Other construction under this feature during the year consisted of the excavation of the S_G lateral extension, L_A lateral extension, C_{1X} lateral, N_E lateral wasteway, the T_A lateral, and the N_X lateral, and the installation of necessary timber structures for the same.

Numerous miscellaneous minor timber structures were installed in the lateral system.

Land preparation.—Leveling of lands on the tract north of Carson Lake, started May 25, 1917, was continued until February 27, using two Holt tractors and leveling equipment. After this date three new tractors were also employed, making a battery of five machines and equipment which continued operations throughout the year.

Leveling of Carson Lake tract was completed May 28, 1918, with the preparation of 1,030 acres of land.

In addition to the leveling of public lands prior to settlement, Government tractors and equipment leveled 139 acres of land for the Frank Ranch & Cattle Co., March to June, 1918, under contract with this company, payment for all work done being made in advance.

Under date of June 12, 1918, the director and chief engineer approved a form of contract for land leveling to be entered into between the United States and holders of homestead lands. Under this form of contract leveling operations, using Government equipment, were commenced during June on farm units owned by F. P. Steinbrook and J. C. Moore and John P. Green.

Only rough leveling of lands was done on these lands by Government forces.

One 80-acre unit of Government land in the Carson Lake tract, under lease to E. S. Berney for a period of three years, was finished by the lessee and planted to grain, the Government to receive a portion of the crop upon harvesting.

Drainage construction.—Excavation of the Harmon drain in the Stillwater district, which was commenced on May 14, 1917, was continued until completion on September 22, 1917, at which time a total of 59,650 cubic yards of material in a length of 6,560 feet had been excavated. Construction work was accomplished using a Monighan drag-line excavator with one cubic yard Page bucket. This drain is of the deep open-cut type and was undertaken for the relief of Piute Indian and other lands.

As authorized by the director and chief engineer on June 28, 1917, actual excavation of the Fernley drain was commenced on November 22, 1917, using the Monighan drag-line excavator, which had been overhauled after the completion of the Harmon drain. At the end of the fiscal year 129,650 cubic yards of material in a total length of 17,747 feet had been removed in the construction of this drain, which is of the deep open type. This work was done under supplemental construction under public notice dated October 30, 1917, the cost to be paid by the people in the Fernley district, and was almost completed on June 30, 1918. All necessary structures were placed, consisting in the installation of 5 timber bridges, 4 metal flumes, 1 corrugated metal culvert, 1 timber combined drop and culvert, 1 cast-iron and concrete culvert under the Southern Pacific Railroad, and the lowering of 1 concrete railroad culvert.

On March 19, 1918, a new walking Monighan drag-line excavating machine, model No. 1-T with 1 cubic yard bucket, arrived. On June 11 this machine was assembled and moved under its own power to a point 9 miles south of Fallon, where cleaning of the South Fork of the Carson River and the L_C drain was commenced. This work was being done as maintenance.

Fernley stock-water pipe lines.—During October, 1917, work of laying 7 miles of 3, 4, and 6 inch wood stave pipe line diverting water from the Truckee Canal for a stock-water supply in the Fernley district, was commenced, and was completed during January, 1918. The establishment of this system will permit the drying up and cleaning of laterals during the nonirrigation season, which was impossible when it was necessary to deliver stock and domestic water through them. This work was also done under supplemental construction under public notice dated October 30, 1917.

Carson Lake pasture.—In order to provide a much needed project pasture, work was started on May 4, 1918, on fencing the Carson Lake pasture area. At the end of the fiscal year the fence was completed with the building of 19 miles of barbed wire fence. Corrals and irrigation laterals remain to be constructed.

Lahontan Dam spillway and outlet gate repairs.—During the year the remodeling and repair of the Lahontan Dam high-pressure outlet gates was undertaken, some work remaining to be done on June 30, 1918. Work of resurfacing portions of the Lahontan dam spillways with gunite was also commenced and partially completed during the year.

Miscellaneous.—One ditch rider's station in the Soda Lake district was constructed.

One mile of telephone line was constructed in the Grimes district.

Numerous timber lateral structures were installed.

The addition to the Fallon office building was completed and occupied.

For the proper irrigation of lands leveled by the Government north of Carson Lake, the banks of the AA line canal were raised, involving the moving of about 13,000 cubic yards of material.

A 15-inch vitrified pipe and concrete takeout from the Truckee Canal at station 730 was installed.

In the V line canal at station 45 one redwood timber turnout was installed.

In order to provide better service for several laterals diverting from the Truckee Canal a timber and rock crib check structure was constructed in the Truckee Canal at station 1053+20.

On August 2, 1917, surveys and investigations were commenced in connection with the proposed upper Carson unit and were continued throughout the year in the field and office. During May, 1918, diamond drilling at the Horseshoe Bend dam site on the East Fork of the Carson River was commenced.

One mile of wire fence was constructed for the forming of a pasture for Government stock in district No. 2.

SEEPAGE AND DRAINAGE.

During August, 1917, seeped and alkalied area surveys were made as the basis for the elimination of charges on badly affected lands covering 13 farm units not heretofore considered. A total of 181 acres was found to be unfit for cultivation. In addition to these surveys inspection was made of 47 farm units on which a portion of the area had been under the temporary elimination of charges due to seepage or alkali conditions during the previous year. A total of 1,135 acres was recommended for a temporary deduction of charges until reclaimed or crops could be produced.

As previously mentioned the Harmon drain in the Stillwater district was completed and the Fernley drains were partially constructed. These drains and others of the same deep open-cut type on other parts of the project are of considerable benefit in their respective districts.

Although petitions, prepared for presentation to the board of county commissioners of Churchill County, contained a sufficient number of names of land owners and acreage, no definite or final action toward the forming of an irrigation district under the Nevada State law was taken, although numerous water users' meetings were held and other steps taken toward such an end. Project drainage is probably the most important benefit to be derived through such an organization.

Drainage investigations, consisting of topographic surveys, measurement of ground-water elevations in test wells, and miscellaneous studies were carried on during the year.

ECONOMIES OF GOVERNMENT WORK.

Owing to the extremely high prices for all labor and materials and to the difficulty in securing help during the greater part of the year, work could not be economically accomplished by any means.

The inability of securing stock and labor from project farmers made work by Government forces necessary in many instances, especially in doing the maintenance work on the project irrigation system.

No large items of construction work were in progress during the year; drainage and Fernley stock-water pipe-line construction involved the largest expenditures for work done. No advertisements for proposals for these construction features were issued owing to the comparatively small extent of the work and its location. Using a distillate-driven dragline excavator with one cubic-yard Page bucket, excavation of the Harmon drain was accomplished for 9 cents per cubic yard, and Fernley drain material was moved for 8.3 cents per cubic yard, both figures representing costs exclusive of overhead charges.

BOARD MEETINGS.

Date.	Topic.	Personnel.
1917.		
Oct. 10	Repair to outlet gates, Lahontan Dam	D. C. Henny, consulting engineer; J. L. Savage, James M. Gaylord, and project manager.
Oct. 12	Lahontan Dam structures	D. C. Henny, consulting engineer; D. W. Cole, senior engineer; John T. Whistler, project manager.
Nov. 20	Truckee-Carson project, general matters	F. E. Weymouth, chief of construction; John F. Richardson, project manager.
Nov. 21	Upper Carson unit investigations	Do.
Dec. 18	Upper Carson Valley storage and Upper Carson Valley investigations.	D. C. Henny, consulting engineer; James Munn, consulting engineer; John F. Richardson, project manager.
Do...	Required capacity of Truckee Canal and acquisition of Upper Truckee storage.	D. C. Henny, consulting engineer; John F. Richardson, project manager.
1918.		
Feb. 26	Division of operation and maintenance cost between power and irrigation, Truckee-Carson project.	D. C. Henny, consulting engineer; R. M. Patrick, assistant district counsel; John F. Richardson, project manager.
Do...	Financial status of operation and maintenance charges for 1918, Truckee-Carson project.	D. C. Henny, consulting engineer; R. M. Patrick, assistant district counsel; John F. Richardson, project manager.
June 20	Upper Carson unit investigations, Horseshoe Bend dam site.	D. C. Henny, consulting engineer; John F. Richardson, project manager; W. A. Perkins, assistant engineer.

OPERATION AND MAINTENANCE.

Water supply.—The natural flow of the Truckee and Carson Rivers with the combined storage in Lake Tahoe and Lahontan Reservoir was far in excess of actual project needs. Lake Tahoe reached its maximum elevation of 6,229.78 feet on July 17. This represented a storage of 693,600 acre-feet, of which 92,400 acre-feet were available for project use. Lahontan Reservoir reached its maximum elevation of 4,153.90 feet on July 7 with a storage of 202,850 acre-feet.

At the end of the irrigation season on October 15, there remained in Lake Tahoe 70,300 acre-feet of United States storage. Lahontan Reservoir contained 130,000 acre-feet at the close of the season, of which 115,000 acre-feet were wasted in order to facilitate repairs on the outlet gates.

The snow accumulation at Summit, Cal., during the winter of 1917–18 was the smallest recorded since the beginning of the Truckee-Carson project. Starting in January it reached a peak of 120 inches about the middle of March and disappeared by the middle of May. Snow fall on other watersheds of the Truckee and Carson Rivers was also below normal. Lake Tahoe and Lahontan Reservoirs reached their maximum elevation of 6,228.70 feet and 4,146.50 feet, respectively, on June 23, 1918. These figures represent a total storage of 564,000 acre-feet for Lake Tahoe and 153,850 acre-feet for Lahontan.

At the beginning of the 1918 irrigation season the available storage belonging to the Reclamation Service amounted to 64,468 acre-feet. On July 1, 1918, this amount had been cut down to 52,160 acre-feet.

Use of water.—The following table taken from the annual operation and maintenance report of the Truckee-Carson project shows the use of water on the entire project for the years 1910 to 1917, inclusive.

Year.	Area irrigated.	Amount of water.				Duty of water.	
		Diverted.	Wasted.	Lost.	Distributed to farms.	Gross.	Net.
	Acres.	*Acre-feet.*	*Acre-feet.*	*Acre-feet.*	*Acre-feet.*	*Feet.*	*Feet.*
1910	27,562	177,577	12,570	36,758	128,249	6.00	4.65
1911	30,139	212,562	14,943	53,873	143,746	6.56	4.48
1912	36,620	164,063	1,496	82,656	86,611	4.48	2.50
1913	43,075	186,175	10,966	68,234	106,975	5.68	2.25
1914	39,615	268,028	49,568	80,356	138,104	6.77	3.28
1915	40,295	233,693	49,018	66,440	118,235	5.80	2.94
1916	39,449	264,186	54,429	78,964	130,793	6.69	3.32
1917	40,392	263,433	53,037	85,021	125,375	5.27	3.05
Mean						5.91	3.48

During 1917, 187,966 acre-feet of water were diverted from the Truckee River into the main Truckee Canal. Of this amount 27,033 acre-feet were distributed for the irrigation of 4,042 acres of farm lands in the Fernley and Northam districts, 37,722 acre-feet were spilled into Lahontan Reservoir, 65,721 acre-feet were used for power development, and 57,490 acre-feet were wasted or lost in transmission. At the Carson diversion dam 230,746 acre-feet were diverted into the V and T canal systems. Of this amount 73,081 acre-feet were distributed to 25,901 acres of land covered by Truckee-Carson water-right contracts, 25,261 acre-feet to 10,439 acres of land covered by unsettled Carson River water rights, 79,944 acre-feet were lost in transmission and 52,270 acre-feet were wasted through spillways and drains.

The operation of the system was in charge of the water master at the headquarters office in Fallon, assisted by one hydrographer and necessary gate tenders and ditch riders.

Maintenance work.—Owing to increased demand for improved farm lands and high prices for farm products, it was practically impossible to secure farm labor for maintenance work. This, combined with the scarcity and high price of common labor, made the maintenance of the project system a very difficult problem.

Efforts at economy in the past had permitted a heavy growth of trees to become established on the inner slopes of the main canals. These trees have become gradually undermined until numbers of them are falling into the canals and becoming a serious menace not only to the canals but also to the adjacent property. A large portion of time was spent during the summer of 1917 pulling out these trees. As the work had to be done with stock, it was necessarily slow and expensive and will take several years to finish. The distribution and rapid growth of water moss in the canals throughout the project have become another serious problem to handle. Up to the present time this growth has been handled without serious interruption to water service by dragging the ditches with heavy chains and disc harrows.

After the close of the irrigation season in October, 1917, the entire maintenance force was employed continuously until April in cleaning the lateral distribution system in the Sheckler, Soda Lake, Northam, and Fernley districts, and in the repair and installation of structures over the entire project.

Rise of ground water and heavy growth of tules and other swamp vegetation have rendered the surface drainage system almost useless.

Little or no good can be obtained by cleaning these drains until lower outlets are provided by a deep drainage system.

Only two serious breaks occurred during the year. On April 18 a 65-foot section of the east bank of the Truckee canal about 1 mile north of Lahontan dam washed out. This break was caused by extreme fluctuation of the water in the canal due to efforts to maintain a sufficient flow in the canal for power and irrigation purposes while regulating the flow to facilitate the installation of a check structure in the main canal near Hazen. No damage resulted to property and very little to crops on account of this break.

On April 24 a 30-foot section of the south bank of the V canal, one-half mile above the wasteway, washed out. This break was probably caused by muskrats. Deliveries below the break were delayed about 12 hours. No damage to lands or crops was reported.

On April 3, 1918, public notice was issued fixing the annual operation and maintenance charges for the season of 1918 and thereafter until further notice.

Historical review, Truckee-Carson project.

Item.	1913	1914	1915	1916	1917	To June 30, 1918.
Acreage for which service was prepared to supply water	52,039	52,039	65,000	70,915	70,915	71,817
Acreage irrigated	43,075	39,615	40,295	39,449	40,392	41,500
Number of farms irrigated	494	504	571	584	600	610
Miles of canal operated	294	300	304	305	355	360
Water diverted (acre-feet)	186,175	268,028	233,693	264,186	263,433	....
Water delivered to land (acre-feet)	106,975	138,104	118,235	130,793	125,375	....
Per acre of land irrigated (acre-feet)	2.25	3.28	2.94	3.32	3.05	....

SETTLEMENT.

During the fiscal year 21 homesteads, aggregating 1,328 irrigable acres of land, were entered. Nine water-right applications, covering 363 acres of irrigable land in private ownership, were filed and 2,125 acres of Carson River water rights were settled. Against the above figures are recorded 4 cancellations covering 222 acres, leaving a net gain of 3,594 acres over the preceding year.

The status of available land on the project has been very discouraging to settlement during the past year. Such public land as was open to homestead entry has been on the official farm-unit plats for a number of years and is scattered in isolated tracts over practically the entire project. By this process the best of the available land has been culled out until there is nothing subject to entry remaining that will attract settlement. The private lands subject to water-right application were placed on the official plats in 1914 and 1916 and now bear an accrued penalty of from $6 to $9 per acre.

This has had the effect of placing these lands almost beyond the possibility of settlement. Numerous prospective settlers have looked them over and decided to go elsewhere or wait until new lands are opened at the $60 rate of construction charge.

High prices for improved land and farm produce have started a strong "back to the farm" movement, and were the penalty removed from the private lands and a new block of good public land opened to homestead entry it is reasonably sure that the Truckee-Carson project would grow and prosper as it should.

Settlement data, Truckee-Carson project.

Item.	1913	1914	1915	1916	1917	1918
Total number of farms on project	494	494	540	584	600	610
Population	1,635	1,635	1,867	2,022	2,197	2,225
Number of irrigated farms	494	494	540	584	600	610
Operated by owners or managers	439	439	480	514	525	530
Operated by tenants	55	55	60	70	75	80
Population	1,635	1,635	1,867	2,022	2,197	2,225
Number of towns	4	4	4	4	4	4
Population	1,250	1,250	1,400	1,360	1,860	1,900
Total population towns and on farms	2,885	2,885	3,267	3,382	4,057	4,125
Number of public schools	18	19	20	18	16	14
Number of churches	8	8	8	9	7	7
Number of banks	1	1	1	1	2	2
Total capital stock	$106,000	$100,000	$100,000	$100,000	$116,000	$116,000
Amount of deposits	$300,000	$350,000	$300,000	$342,000	$371,240	$632,000
Number of depositors	600	650	700	700	775	1,214

PRINCIPAL CROPS.

Alfalfa continues to be the predominating crop on the Truckee-Carson project. The 1917 crop census reported 20,360 acres planted to alfalfa, which yielded an average of 3.57 tons per acre, or a total of 72,769 tons.

The prevailing price of $15 per ton in the stack at the close of the season, coupled with the scarcity of cheap labor, has made this crop so attractive to the farmers that the idea of raising sugar beets during the 1918 season has been abandoned, and all available land has been planted to alfalfa and grain, which, from present indications, promise to produce the largest returns for both these staples ever recorded on the project. The local sugar factory and creamery have both discontinued business, the latter being now a receiving station for the Nevada Packing Co., of Reno, Nev.

Crop report, Truckee-Carson project, Nevada, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	20,360	Ton	72,769	3.57	15.00	$1,091,535	$53.61
Barley	1,116	Bushel	26,834	24.05	1.25	33,540	30.05
Wheat	2,532	...do	43,233	17.07	1.90	82,143	32.45
Oats	27	...do	938	34.74	1.00	938	34.74
Potatoes	322	...do	56,433	175.25	.90	50,790	157.73
Garden and miscellaneous	555	...do				43,480	78.34
Sugar beets	2,168	Ton	11,048	5.09	8.00	88,384	40.76
Hay (grass and grain)	940	...do	763	.81	10.00	7,630	8.10
Alfalfa (planted 1917)	2,141	...do	402	.19	15.00	6,030	2.82
Pasture (wild grass)	10,100	...do				15,206	1.51
Pasture alfalfa after cutting						30,804	
Less duplicated areas	1,025						
Total cropped	39,236	Total and average				1,450,480	[1] 51.36

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop	1,156	Total irrigable area farms reported	60,758	600	29.50
		Total irrigated area farms reported	40,392	600	19.60
Total irrigated	40,392	Total cropped area farms reported	39,236	600	19.05

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[1] For lands in full production, excluding 10,100 acres of wild grass pasture and other fields not in full production, including these, $37.

WATER USERS' ACTIVITIES.

No final action was taken by the project water users toward the formation of an irrigation district, although, during April, 1918, a sufficient number of names were on the petitions representing an acreage great enough to warrant action by the county commissioners of Churchill County in presenting this matter before the water users for final vote. Several legal obstacles and other delays, however, prevented the turning over of petitions and other records to the county commissioners for definite action. It is believed that a majority of the project water users realize the benefit of such an organization and the importance of securing project drainage by such means.

On March 8, 1918, the new Churchill County High School in Fallon, Nev., was dedicated, Dr. W. B. Clark, president of the University of Nevada, making the principal address.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, JULY 16, 1917.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, and particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), public notice for certain lands of the Truckee-Carson Project, Nevada, is hereby given as follows

2. **Lands for which water will be furnished.**—Upon proper application being made therefor, water will be furnished under said project in the irrigation season of 1917 and thereafter for the irrigable areas of the following described four farm units of public land: N½ SE¼ Sec. 21, T. 18 N. R. 29 E., M. D. B. M., or Farm Unit E; SW¼ SW¼ Sec. 32, T. 19 N. R. 28 E., M. D. B. M., or Farm Unit P; S½ NE¼ Sec. 24, T. 20 N. R. 24 E., M. D. B. M., or Farm Unit F; SE¼ Sec. 24, T. 20 N. R. 24 E., M. D. B. M., or Farm Unit G.

Farm-unit plats of said townships 19 and 20 were approved by the Secretary of the Interior August 17, 1914, and a farm-unit plat of said township 18 was so approved January 28, 1916. Amendments to said plats showing the farm units above described were approved by said Secretary July 16, 1917. All of said plats as amended are on file at the local land office at Carson City, Nev., and at the office of the project manager, United States Reclamation Service, at Fallon, Nev.

3. **When and how to make entry for public land.**—Homestead entries for the four farm units shown on said plats as amended, and as described above, embracing public lands of the United States, may be made beginning August 8, 1917, at 9 o'clock a. m., at said local land office at Carson City, Nev. Every person desiring to acquire any of said public land must execute a homestead application subject to the provisions of the reclamation law in manner required by law, which, with the required fees and commissions, accompanied by certificate of the project manager as to the filing of water-right application and payment of water-right charges as hereinafter provided, may be presented to said local land office, in person, by mail, or otherwise, during a period of five days prior to the opening, to-wit: On and from August 3, 1917, to and including 9 o'clock a. m., August

8, 1917. Applications presented after said period of five days will be filed and noted in the order of their receipt. Any application not based on a prior settlement right will be subject to valid settlement claims asserted in the manner required by law.

4. **Simultaneous filings for public land.**—Applications reaching said local land office within the said period of five days will be held and treated as simultaneously filed, and the register and receiver will dispose of them as follows:

(*a*) Where there is no conflict the application will be allowed, irrespective of whether settlement is alleged.

(*b*) In case of conflicting applications, and only one of the applicants alleges prior settlement, his application will be allowed and the others rejected.

(*c*) If two or more conflicting applications, each containing allegations of prior settlement, are received a hearing, restricted to those alleging such right, will be ordered to determine the priority of right.

(*d*) Where there are conflicting applications in which no one of the several applicants claims prior settlement the register and receiver will write on cards the names of the several applicants, and each of these cards will be placed in an envelope upon which there is no distinctive or identifying mark, and at 2 o'clock p. m., on the date of opening to entry, if practicable (if not, at the same hour one day later), after all the envelopes containing the names of the several applicants shall have been thoroughly mixed in the presence of such persons as may desire to be present, they will be drawn and numbered in order. The cards as drawn and numbered will be securely fastened to the applications of the respective persons, and the applications will be allowed in such order. Applications conflicting in whole with those previously allowed will be rejected in the usual manner.

5. **Failure of applicant to obtain public land applied for.**—Where any applicant fails to obtain land applied for by him he will be permitted to elect whether he will amend his application to embrace other lands not affected by pending applications and otherwise subject thereto when such amended application is presented, or withdraw his original application without prejudice. In the event of such withdrawal the fees and commissions will be returned by the receiver, and the water-right charges deposited will be returned by the project manager upon surrender of the certificate of filing issued by the project manager.

6. **Warning against unlawful settlement upon public land.**—No person will be permitted to gain or exercise any right whatever under any settlement or occupation of any of said public lands, begun at or prior to 9 a. m., August 8, 1917; provided, however, that this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

7. **Limit of area for which water right may be secured.**—The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such lands, is fixed as shown upon the said plats.

8. **Application for water right.**—All water-right applications must be made to the project manager, United States Reclamation Service, Fallon, Nev., upon forms provided for that purpose. Every applica-

tion must be accompanied by the proper initial water-right payment, which will be accepted by the project manager in the form of New York draft or money order payable to special fiscal agent, United States Reclamation Service, Fallon, Nev., or in currency. Each water-right application must be for a specific farm unit, and more than one person may make such application for the same unit. A certificate of filing will be issued each applicant by the project manager. Filing of water-right application and issuance of certificate give no preference right to entry on public lands. Only when the project manager is notified by the local land office that entry has been allowed will acceptance of the water-right application be indorsed thereon. Whereupon all other water-right applications affecting the farm unit in question with payments made will be returned to the respective applicants upon surrender by them of the certificates of filing issued by the project manager.

9. **Classes of charges for water rights.**—The water-right charges are of two kinds, to-wit: (1) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge; and (2) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

10. **Construction charge.**—The construction charge shall be $60 per acre of irrigable land, payable as follows: Five per centum of the construction charge shall be paid at the time of filing water-right application, and the remainder of the construction charge shall be paid in 15 annual installments, the first five of which shall each be 5 per centum and the remainder each 7 per centum of the total construction charge. The first of said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

11. **Advance payment of construction charge permissible.**—Any water-right applicant may, at his option, pay in advance the whole or any part of the construction charge owing by him within any shorter period than that prescribed by this notice.

12. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1917 and thereafter until further notice, shall be of the same amount as for other like lands under the said project. Such charge will be due and payable on March 1 of each year for the preceding irrigation season, but where water-right application is made for public land entered under the reclamation law after June 15 in any year no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

13. **Place and manner of payment of water charges.**—All water-right charges must be paid at the office of the United States Reclamation Service at Fallon, Nev., in cash, or by New York draft or money order payable to the special fiscal agent, United States Reclamation Service.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

ORDER, JULY 31, 1917.

Public notices heretofore issued and farm unit plats applicable thereto and heretofore filed in connection with the Truckee-Carson project under provisions of the Reclamation Act of June 17, 1902 (32 Stat., 388) and acts of Congress amendatory thereof or supplementary thereto, are hereby suspended as to all farm units listed below, and it is hereby ordered that no applications for entry or water-right applications may be received or accepted for such farm units until further notice.

MOUNT DIABLO MERIDIAN, NEVADA.

- T. 20 N., R. 26 E.:
  - Sec. 32, farm unit A or E. ½ NE. ¼.
  - Sec. 32, farm unit B or W. ½ NE. ¼.
  - Sec. 34, farm unit N or SE. ¼ NW. ¼.
  - Sec. 34, farm unit P or NE. ¼ SW. ¼.
- T. 19 N., R. 27 E.:
  - Sec. 8, farm unit G or SW. ¼ NE. ¼.
  - Sec. 8, farm unit H or NW. ¼ SE. ¼.
  - Sec. 8, farm unit K or SE. ¼ SE. ¼.
  - Sec. 14, farm unit G or SE. ¼ SW. ¼.
  - Sec. 14, farm unit H or SW. ¼ SW. ¼.
  - Sec. 22, farm unit E or NW. ¼ NW. ¼.
  - Sec. 24, farm unit C or NE. ¼ NE. ¼ and N. ½ SE. ¼ NE. ¼.
  - Sec. 24, farm unit D or S ½ SE. ¼ NE. ¼ and NE. ¼ SE. ¼.
- T. 19 N., R. 28 E.:
  - Sec. 17, farm unit D or S. ½ NE. ¼.
  - Sec. 17, farm unit E or N. ½ SE. ¼.
  - Sec. 18, farm unit B or W. ½ NW. ¼.
  - Sec. 18, farm unit E or NE. ¼ NW. ¼.
  - Sec. 18, farm unit F or SE. ¼ NW. ¼.
  - Sec. 18, farm unit G or N. ½ SW. ¼.
  - Sec. 18, farm unit H or S. ½ SW. ¼.
  - Sec. 20, farm unit H or SW. ¼ NE. ¼ and NW. ¼ SE ¼.
  - Sec. 20, farm unit K or N. ½ SW. ¼.
  - Sec. 20, farm unit L or S. ½ SW. ¼.
  - Sec. 21, farm unit G or SE. ¼ NW. ¼ and NE. ¼ SW. ¼.
  - Sec. 21, farm unit H or SW. ¼ NW. ¼ and NW. ¼ SW ¼.
  - Sec. 21, farm unit J or S. ½ SW. ¼.
  - Sec. 21, farm unit K or S. ½ SE. ¼.
  - Sec. 24, farm unit H or E. ½ NE. ¼.
  - Sec. 24, farm unit J or N. ½ NW. ¼ and NW. ¼ NE. ¼.
- T. 18 N., R. 29 E.:
  - Sec. 3, farm unit C or NE. ¼ NW. ¼ and NW. ¼ NE ¼.
  - Sec. 3, farm unit D or NW. ¼ SW. ¼.
  - Sec. 3, farm unit E or S. ½ SW. ¼.
  - Sec. 4, farm unit M or SW. ¼ NE. ¼.
  - Sec. 4, farm unit N or Lot 5.
  - Sec. 9, farm unit L or N. ½ NW. ¼.
  - Sec. 9, farm unit M or S. ½ NW. ¼.
  - Sec. 10, farm unit M or NW. ¼ NE. ¼.
  - Sec. 10, farm unit N or SW. ¼ NE. ¼.
  - Sec. 10, farm unit P or NE. ¼ NW. ¼.
  - Sec. 12, farm unit L or S. ½ NE. ¼.

T. 18 N., R. 29 E.—Continued.
  Sec. 12, farm unit N or S. ½ SE. ¼.
  Sec. 13, farm unit H or N. ½ NE. ¼.
  Sec. 13, farm unit K or S. ½ NE. ¼.
  Sec. 13, farm unit J or N. ½ NW. ¼.
T. 19 N., R. 29 E.:
  Sec. 8, farm unit H or N. ½ SW. ¼.
  Sec. 8, farm unit G or W. ½ NE. ¼ and NW. ¼ SE. ¼.
  Sec. 36, farm unit H or E. ½ NE. ¼.
T. 19 N., R. 30 E.:
  Sec. 18, farm unit J or SW. ¼ SW. ¼.
  Sec. 14, farm unit J or W. ½ NW. ¼.
  Sec. 20, farm unit A or NW. ¼ NW. ¼.
  Sec. 23, farm unit N or NE. ¼ NW. ¼.
  Secs. 23 and 26, farm unit M or SE. ¼ SE. ¼, sec. 23, and NE. ¼ NE. ¼ sec. 26.
  Secs. 23 and 26, farm unit L or SW. ¼ SW. ¼, sec. 23 and NW. ¼ NW. ¼ sec. 26.
  Sec. 24, farm unit Q or W. ½ NW. ¼.
  Sec. 24, farm unit R or E. ½ NW. ¼ and W. ½ SW. ¼. NE. ¼.
  Sec. 24, farm unit N or N. ½ SW. ¼.
  Sec. 24, farm unit P or S. ½ SW. ¼.
  Sec. 27, farm unit H or N. ½ NE. ¼.
  Sec. 27, farm unit J or W. ½ NW. ¼.
  Sec. 28, farm unit Q or E. ½ NE. ¼.
  Sec. 28, farm unit P or E. ½ SE. ¼.
  Sec. 30, farm unit L or S. ½ SW. ¼.
  Sec. 30, farm unit K or E. ½ SE. ¼.
  Sec. 30, farm unit J or W. ½ SE. ¼.
T. 19 N., R. 31 E.:
  Sec. 18, farm unit G or E. ½ SW. ¼.

FRANKLIN K. LANE,
Secretary of the Interior.

PUBLIC NOTICE, OCTOBER 30, 1917.

1. **Supplemental construction.**—Under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof, and supplementary thereto, particularly section 4 of the reclamation extension act of August 13, 1914 (38 Stat., 686), a majority of the water-right applicants and owners of the lands included in the Fernley district of the Truckee-Carson project, Nev., all of which lands are subject to the provisions of said reclamation extension act, have made agreements providing for an increase in the cost of construction in the sum of $10 per irrigable acre. This increased cost is for the building of the Fernley east drain, the Fernley branch drain and of stock water supply pipe lines as follows: K^a, K^b, K^{ba} Main, K^{ba} West Branch, K^{ba} East Branch, K^c Main, K^c East Branch, K^d Main, K^d West Branch and KE; all of which supplemental construction will involve a cost of not to exceed $10 per irrigable acre of land.

2. **Ratification.**—The said agreements are hereby ratified and confirmed and the said increase in the construction charge of $10

per irrigable acre is hereby made effective in accordance with the conditions of the said agreements as hereinafter specified.

3. **Lands affected.**—The lands that are subject to increased charge are the lands subject to the reclamation extension act and within the first unit of the project in the following sections or portions of sections:

Twp. 20 N., R. 24 E., Mount Diablo meridian: All of sec. 10, south and east of the eastern boundary of the Pyramid Lake Indian Reservation (L. O. S. 1878); sec. 11, S. ½; sec. 12, except N. ½ NW. ¼; secs. 13 and 14; sec. 15, N. ½ NE. ¼, SE. ¼ NE. ¼ and NE. ¼ SE. ¼; sec. 23, N. ½ N. ½; sec. 24, E. ½, N. ½ NW. ¼, and SE. ¼ NW. ¼.

Twp. 20 N., R. 25 E., Mount Diablo meridian: secs. 7, 8, 17, 18, 19, 20, 21, 23, and 24; sec. 22, except S. ½ SW. ¼.

4. **Payment of increased charge.**—Such increased charge of $10 per irrigable acre shall be added to the construction charge against the land in question and be paid in additional annual installments after the last of the installments now payable under the reclamation extension act, being two annual installments of $5 each per irrigable acre.

Alexander T. Vogelsang,
Acting Secretary of the Interior.

PUBLIC NOTICE, JANUARY 2, 1918.

1. **Land for which water will be furnished.**—In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts both amendatory thereof and supplementary thereto, notice is hereby given that water will be furnished under the Truckee-Carson project, Nev., in the irrigation season of 1918 and thereafter, for the irrigable lands of the NE. ¼ of sec. 25, T. 19 N., R. 26 E., Mount Diablo meridian, in the second unit of said project, shown on a farm-unit plat of said township approved by the Secretary of the Interior, September 6, 1911, amended by the Director of the Reclamation Service, January 2, 1918, and on file at the office of the project manager, United States Reclamation Service, at Fallon, Nev., and at the local land office at Carson City, Nev.

2. **Water-right application for land in private ownership.**—Water-right application for lands in private ownership included in said second unit in the NE. ¼ of said sec. 25 may be made on or after the date of this public notice. The limit for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

3. **Classes of charges for water rights.**—The water-right charges are of two kinds, to wit: (1) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge; and (2) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

4. **Construction charge.**—The construction charge shall be $60 per acre of irrigable land, payable as follows: Five per cent of the construction charge shall be paid at the time of filing water-right application, and the remainder of the construction charge shall be paid in 15 annual installments, the first 5 of which shall each be 5 per cent and the remainer each 7 per cent of the total construction charge. The first of said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment,

and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

5. **Increased construction charge in certain cases.**—In all cases where water-right application for lands in private ownership shall not be made within one year from the date of this notice, the construction charge for such lands shall be increased 5 per cent each year until such application is made and an initial installment paid.

6. **Advance payment of construction charge permissible.**—A water-right applicant, may, at his option, pay in advance the whole or any part of the construction charge owing by him within any shorter period than that prescribed by this notice.

7. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice shall be of the same amount as announced for the lands of the Fernley and Hazen benches, Truckee-Carson project, in public notice of March 22, 1917. Such charge will be due and payable on March 1 of each year for the preceding irrigation season.

8. **Place and manner of payment of water charges.**—All water-right charges must be paid at the office of the United States Reclamation Service at Fallon, Nev., in cash, or by New York draft, or money order, payable to the special fiscal agent, United States Reclamation Service.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

ORDER, JANUARY 15, 1918.

1. **Order of July 31, 1917, vacated.**—The departmental order of July 31, 1917, suspending until further notice the public notices and farm-unit plats affecting certain public lands of the United States described in said order and located upon the Truckee-Carson project, Nevada, is hereby vacated and set aside, and said public notices and farm-unit plats are again made effective for said public lands.

2. **Lands affected.**—The public lands affected by the order of July 31, 1917, and by this order are described as follows:

MOUNT DIABLO MERIDIAN, NEVADA.

T. 20 N., R. 26 E.:
  Sec. 32, farm unit A or E. ½ NE. ¼.
  Sec. 32, farm unit B or W. ½ NE. ¼.
  Sec. 34, farm unit N or SE. ¼ NW. ¼.
  Sec. 34, farm unit P or NE. ¼ SW. ¼.
T. 19 N., R. 27 E.:
  Sec. 8, farm unit G or SW. ¼ NE. ¼.
  Sec. 8, farm unit H or NW. ¼ SE. ¼.
  Sec. 8, farm unit K or SE. ¼ SE. ¼.
  Sec. 14, farm unit G or SE. ¼ SW. ¼.
  Sec. 14, farm unit H or SW. ¼ SW. ¼.
  Sec. 22, farm unit B or NW. ¼ NW. ¼.
  Sec. 24, farm unit C or NE. ¼ NE. ¼ and N. ½ SE. ¼ NE. ¼.
  Sec. 24, farm unit D or S. ½ SE. ¼ NE. ¼ and NE. ¼ SE. ¼.
T. 19 N., R. 28 E.:
  Sec. 17, farm unit D or S. ½ NE. ¼.
  Sec. 17, farm unit E or N. ½ SE. ¼.
  Sec. 18, farm unit B or W. ½ NW. ¼.

- T. 19 N., R. 28 E.—Continued.
  - Sec. 18, farm unit E or NE. ¼ NW. ¼.
  - Sec. 18, farm unit F or SE. ¼ NW. ¼.
  - Sec. 18, farm unit G or N. ½ SW. ¼.
  - Sec. 18, farm unit H or S. ½ SW. ¼.
  - Sec. 20, farm unit H or SW. ¼ NE. ¼ and NW. ¼ SE. ¼.
  - Sec. 20, farm unit K or N. ½ SW. ¼.
  - Sec. 20, farm unit L or S. ½ SW. ¼.
  - Sec. 21, farm unit G or SE. ¼ NW. ¼ and NE. ¼ SW. ¼.
  - Sec. 21, farm unit H or SW. ¼ NW. ¼ and NW ¼ SW. ¼.
  - Sec. 21, farm unit J or S. ½ SW. ¼.
  - Sec. 21, farm unit K or S. ½ SE. ¼.
  - Sec. 24, farm unit H or E. ½ NE. ¼.
  - Sec. 24, farm unit J or N. ½ NW. ¼ and NW. ¼ NE. ¼.
- T. 18 N., R. 29 E.:
  - Sec. 3, farm unit C or NE. ¼ NW. ¼ and NW. ¼ NE. ¼.
  - Sec. 3, farm unit D or NW. ¼ SW. ¼.
  - Sec. 3, farm unit E or S. ½ SW. ¼.
  - Sec. 4, farm unit M or SW. ¼ NE. ¼.
  - Sec. 4, farm unit N or Lot 5.
  - Sec. 9, farm unit L or N. ½ NW. ¼.
  - Sec. 9, farm unit M or S. ½ NW. ¼.
  - Sec. 10, farm unit M or NW. ¼ NE. ¼.
  - Sec. 10, farm unit N or SW. ¼ NE. ¼.
  - Sec. 10, farm unit P or NE. ¼ NW. ¼.
  - Sec. 12, farm unit L or S. ½ NE. ¼.
  - Sec. 12, farm unit N or S. ½ SE. ¼.
  - Sec. 13, farm unit H or N. ½ NE. ¼.
  - Sec. 13, farm unit K or S. ½ NE. ¼.
  - Sec. 13, farm unit J or N. ½ NW. ¼.
- T. 19 N., R. 29 E.:
  - Sec. 8, farm unit H or N. ½ SW. ¼.
  - Sec. 8, farm unit G or W. ½ NE. ¼ and NW. ¼ SE. ¼.
  - Sec. 36, farm unit H or E. ½ NE. ¼.
- T. 19 N., R. 30 E.:
  - Sec. 18, farm unit J or SW. ¼ SW. ¼.
  - Sec. 14, farm unit J or W. ½ NW. ¼.
  - Sec. 20, farm unit A or NW. ¼ NW. ¼, now Indian land.
  - Sec. 23, farm unit N or NE. ¼ NW. ¼.
  - Secs. 23 and 26, farm unit M or SE. ¼ SE. ¼ sec. 23 and NE. ¼ NE. ¼ sec. 26.
  - Secs. 23 and 26, farm unit L or SW. ¼ SW. ¼ sec. 23 and NW. ¼ NW. ¼ sec. 26.
  - Sec. 24, farm unit Q or W. ½ NW. ¼.
  - Sec. 24, farm unit R or E. ½ NW. ¼ and W. ½ SW. ¼ NE. ¼.
  - Sec. 24, farm unit N or N. ½ SW. ¼.
  - Sec. 24, farm unit P or S. ½ SW. ¼.
  - Sec. 27, farm unit H or N. ½ NE. ¼.
  - Sec. 27, farm unit J or W. ½ NW. ¼.
  - Sec. 28, farm unit Q or E. ½ NE. ¼.
  - Sec. 38, farm unit P or E. ½ SE. ¼.
  - Sec. 30, farm unit L or S. ½ SW. ¼.
  - Sec. 30, farm unit K or E. ½ SE. ¼.
  - Sec. 30, farm unit J or W. ½ SE. ¼.
- T. 19 N., R. 31 E., sec. 18, farm unit G or N. ½ SW. ¼.

3. **When entries may be made.**—Homestead entries on the farm units of said public lands of the United States may be made beginning at 9 o'clock a. m., February 15, 1918, at the local land office, Carson City, Nev., if found regular and accompanied by the certificate of the project manager, showing that water-right application has been filed and the proper water-right charges deposited.

4. **Warning against unlawful settlement.**—No person will be permitted to gain or exercise any right whatever under any settlement or occupation of any of said public lands begun at or prior to 9 a. m., February 15, 1918; provided, however, that this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

5. **Special condition.**—All entries of said farm units will be subject to the obligation on the part of the entryman and his successors to include the lands entered within the irrigation district to be organized upon the Truckee-Carson project, in accordance with the following provision, which shall be inserted in each water-right application:

The applicant agrees for himself and his successors that as soon as the laws of Nevada permit, all steps will be taken to have the homestead entry, above described, included within an irrigation district on the Truckee-Carson project. If for 30 days after notice is given to him or his successors in interest by the project manager of the Truckee-Carson project to take such steps, he or his said successors fail so to do, this water-right application may, at the option of the Secretary of the Interior, be canceled, with the forfeiture of all rights acquired thereunder and of all payments made thereon.

Franklin K. Lane,
Secretary of the Interior.

PUBLIC NOTICE, APRIL 3, 1918.

1. **Annual operation and maintenance charges.**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly of the reclamation extension act of August 13, 1914 (38 Stat., 686); announcement is hereby made that the annual operation and maintenance charges for the irrigation season of 1918 and thereafter until further notice against all lands of the Truckee-Carson project, Nevada, under public notice, shall be as follows:

(*a*) A minimum charge of $1.25 per irrigable acre will be made whether water is used thereon or not, which charge will permit the delivery of not to exceed three acre-feet of water per irrigable acre upon lands of the Fernley and Hazen benches shown upon a map on file in the project office, and not to exceed one and one-half acre-feet per irrigable acre upon the other lands of the project; and a charge of 40 cents per acre-foot per irrigable acre will be made for all additional water. These rates do not apply, however, to vested-right lands referred to in subdivision (*b*) following:

(*b*) A charge of $1.50 per acre-foot per irrigable acre will be made for any water in addition to three acre-feet per irrigable acre furnished to vested-right land, for which the contract adjusting the vested acreage provides that the United States is to deliver not to exceed three acre-feet per irrigable acre at a fixed charge of 40 cents per acre.

All operation and maintenance charges are due and payable on March 1 of each year for the preceding irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15, or where water-right application is made after August 1 for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

E. C. BRADLEY,
Assistant to the Secretary of the Interior.

PUBLIC NOTICE, APRIL 10, 1918.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), public notice for certain unentered public lands of the Truckee-Carson project, Nevada, which have been leveled in whole or in part by the United States, is hereby given as follows:

2. **Lands for which water will be furnished.**—Upon proper application being made therefor, water will be furnished under said project in the irrigation season of 1918, and thereafter, for the irrigable unentered public lands in the list given below, said list showing (1) the legal subdivision or subdivisions in each farm unit, (2) the irrigable area in each such farm unit, and (3) the construction charge or charges per irrigable acre for the land in each such farm unit. Farm unit township plat No. 17793 of T. 18 N., R. 29 E., Mount Diablo meridian, showing said farm units, was approved by this department on the date of this notice, and a copy of said plat is on file in the local land office at Carson City, Nev., and at the office of the project manager, U. S. Reclamation service at Fallon, Nev.:

T. 18 N., R. 29 E., Mount Diablo meridian, Nevada.

Farm unit.	Section.	Legal subdivision.	Acres irrigable.	Construction charge per irrigable acre.
A	25	SW. ¼ SE. ¼, SE. ¼ SW. ¼	72	$65.00
B	26	SE. ¼ SE. ¼	73	65.00
	25	SW. ¼ SW. ¼		
A	34	S. ½ SE. ¼	80	65.00
A	35	S. ½ NE. ¼	78	115.00
B	35	N. ½ SW. ¼	78	115.00
C	35	N. ½ SE. ¼	78	115.00
D	35	S. ½ SE. ¼	80	115.00
E	35	S. ½ SW. ¼	80	115.00
A	36	NE. ¼ NE. ¼, N. ½ NW. ¼ NE. ¼	57	65.00
	36	S. ½ NW. ¼ NE. ¼	19	115.00
B	36	N. ½ NW. ¼	72	115.00
C	36	S. ½ NW. ¼	76	115.00
D	36	SW. ¼ NE. ¼, W. ½ SE. ¼ NE. ¼	57	115.00
	36	E. ½ SE. ¼ NE. ¼	19	65.00
E	36	N. ½ SE. ¼	78	115.00
F	36	N. ½ SW. ¼	78	115.00
G	36	S. ½ SW. ¼	80	115.00
H	36	S. ½ SE. ¼	80	115.00

Total irrigable area, 1,235 acres.

3. **When and how to make entry for public land.**—Homestead entries for farm units shown on said plats may be made by persons holding approved water-right applications therefor, on and after 9 o'clock a. m., May 2, 1918, at the local land office at Carson City,

Nev. Every person desiring to acquire any of said public land must execute a water-right application upon form provided for that purpose and accompany the same by payment of the water-right charge as hereinafter provided. Each water-right application must be for a specific farm unit and more than one person may make such application for the same farm unit, but not more than one water-right application can be made by the same persons. Such water-right application must be filed with project manager, United States Reclamation service, Fallon, Nev., in person, by mail, or otherwise within a period of five (5) days beginning April 27, 1918, to and including 9 o'clock a. m., May 2, 1918. Water-right applications received after said period of five days will be filed and noted in the order of their receipt.

4. **Simultaneous filing of water-right applications.**—Water-right applications made and filed with the project manager during said five-day period will be held and treated as simultaneously filed and the project manager will dispose of them as follows:

(*a*) Where there is no conflict the water-right application will be approved by the project manager.

(*b*) Where there are two or more water-right applications for the same farm unit the project manager will write on cards the names of the several water-right applicants, and each of those cards containing the name of one such applicant, will be placed in an envelope upon which there is no distinctive or identifying mark, and at 2 o'clock p. m., May 2, 1918, after all the envelopes containing the names of the several water-right applicants shall have been thoroughly mixed in the presence of such persons as may desire to be present, they will be drawn and numbered in order. The cards as drawn and numbered will be securely fastened to the water-right applications of the respective persons, and the water-right applications will be approved in such order by the project manager.

Approval of a water-right application by the project manager will entitle the water-right applicant to file homestead application at said local land office, Carson City, Nev., for the farm unit described in his water-right application. Such homestead application should be made within four days from date of approval of water-right application. Failure to so make such homestead application, entitles the water-right applicant next in order for the same unit to have his water-right application approved by the project manager entitling him to make homestead application, this procedure continuing if necessary as to all applicants. No part of a payment made will be returned to a successful applicant in any case, if he be a qualified homestead entryman.

Failure of applicant to obtain public land applied for.—Where any applicant fails to obtain land applied for by him he will be permitted to elect whether he will amend his application to embrace other lands not affected by pending applications and otherwise subject thereto when such amended application is presented, or withdraw his original application without prejudice. In the event of such withdrawal the water-right charges deposited will be returned by the project manager upon surrender of his receipt.

6. **Warning against unlawful settlement upon public land.**—No person will be permitted to gain or exercise any right whatever under any settlement or occupation of any of said public lands, begun without a valid approved water-right application covering the lands

in question; Provided, however, That this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

7. **Limit of area for which entry may be made.**—The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such lands, is fixed as shown upon the plats for the several farm units.

8. **Classes of charges for water rights.**—The water-right charges are of two kinds, to wit: (1) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge, which charge includes the cost of land leveling, and (2) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

9. **Construction charge.**—The construction charge shall be as shown on the list set out in paragraph 2 hereof, the charge of $65 per acre of irrigable land being for land that has not been leveled by the United States, and the charge of $115 per acre being for land that has been leveled by the United States. Five per cent of the construction charge shall be paid at the time of filing water-right application, and the remainder of the construction charge shall be paid in 15 annual installments, the first 5 of which shall each be 5 per cent and the remainder each 7 per cent of the total construction charge. The first of said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

10. **Advance payment of construction charge permissible.**—Any water-right applicant may, at his option, pay in advance the whole or any part of the construction charge owing by him within any shorter period than that prescribed by this notice.

11. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice, shall be of the same amount as for other like lands under the said project. Such charge will be due and payable on March 1 of each year for the preceding irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

12. **Place and manner of payment of water charges.**—All water-right charges must be paid at the office of the United States Reclamation Service at Fallon, Nev., in cash or by New York draft, or money order, payable to the special fiscal agent, United States Reclamation Service.

E. C. BRADLEY,
Assistant to the Secretary of the Interior.

PUBLIC NOTICE, MAY 7, 1918.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), public notice for certain unentered public land for the Truckee-Carson project, Nevada, is hereby given as follows:

2. **Lands for which water will be furnished.**—Upon proper application being made therefor, water will be furnished under said project in the irrigation season of 1918, and thereafter, for the irrigable areas of unentered public land in the SE. ¼ of sec. 19, Twp. 19 N., R. 30 E., Mount Diablo meridian, the same being part of farm unit J. A farm-unit plat of said township was approved by the department January 28, 1916, and an amendment to said plat showing said farm unit J was approved by the Acting Director of the Reclamation Service March 5, 1918. Said plat as amended is on file at the local land office at Carson City, Nev., and at the office of the project manager, United States Reclamation Service at Fallon, Nev.

3. **Entry for public land.**—Homestead entry for the public lands embraced in the farm unit shown on said plat as amended, and as described above, may be made on and after the date of this notice, at said local land office at Carson City, Nev., if found regular and accompanied by the certificate of the project manager showing that water-right application has been filed and proper water-right charges deposited.

4. **Limit of area for which water right may be secured.**—The limit of area per entry representing the acreage which in the opinion of the Secretary of the Interior may be reasonably required for the support of a family upon such lands, is fixed as shown upon said plat.

5. **Application for water right.**—Water-right application must be made to the project manager, United States Reclamation Service, Fallon, Nev., upon form provided for that purpose. Application must be accompanied by the proper initial water-right payment, which will be accepted by the project manager in the form of New York draft or money order payable to special fiscal agent, United States Reclamation Service, Fallon, Nev., or in currency. Water-right application must be for the specific farm unit.

6. **Classes of charges for water rights.**—The water-right charges are of two kinds, to wit: (1) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge; and (2) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

7. **Construction charge.**—The construction charge shall be $60 per acre of irrigable land, payable as follows: Five per cent of the construction charge shall be paid at the time of filing water-right application, and the remainder of the construction charge shall be paid in 15 annual installments, the first 5 of which shall each be 5 per cent and the remainder each 7 per cent of the total construction charge. The first of said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

8. **Advance payment of construction charge permissible.**—Any water-right applicant may, at his option, pay in advance the whole or any part of the construction charge owing by him within any shorter period than that prescribed by this notice.

9. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1918 and thereafter until

further notice shall be of same amount as for other like lands under the said project. Such charge will be due and payable on March 1 of each year for the preceding irrigation season.

10. **Place and manner of payment of water charges.**—All water-right charges must be paid at the office of the United States Reclamation Service at Fallon, Nev., in cash or by New York draft, or money order, payable to the special fiscal agent, United States Reclamation Service.

E. C. BRADLEY,
Assistant to the Secretary of the Interior.

PUBLIC NOTICE, MAY 20, 1918.

1. **Land for which water will be furnished.**—In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, notice is hereby given that upon proper application being made therefor, water will be furnished under the Truckee-Carson project, Nev., in the irrigation season of 1918 and thereafter for the irrigable lands of the SW. ¼ NE. ¼, SE. ¼ NW. ¼ of sec. 23, T. 18 N., R. 28 E., Mount Diablo meridian, shown on a diagram, approved March 2, 1918, by the reclamation commission, amendatory of farm unit plat of said township approved by the department August 17, 1914; also the irrigable lands of the SE. ¼ NE. ¼ of sec. 13, T. 19 N., R. 30 E., Mount Diablo meridian, shown on a diagram, approved March 2, 1918 by the reclamation commission, amendatory of farm unit plat of said township approved by the department January 28, 1916. Copies of the amendatory diagrams and township plats are on file at the office of the project manager, United States Reclamation Service, at Fallon, Nev., and at the local land office at Carson City, Nev.

2. **Water-right application.**—Water-right application for lands in private ownership shown on said diagrams may be made on or after the date of this public notice. The limit or which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each land owner.

3. **Classes of charges for water rights.**—The water-right charges are of two kinds, to wit: (1) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge; and (2) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

4. **Construction charge.**—The construction charge shall be $60 per acre of irrigable land. Five per cent of the construction charge shall be paid at the time of filing water-right application, and the remainder of the construction charge shall be paid in 15 annual installments, the first 5 of which shall each be 5 per cent and the remainder each 7 per cent of the total construction charge. The first of said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

5. **Increased construction charge in certain cases.**—In all cases where water-right application for lands in private ownership shall not be made within one year from the date of this notice, the construction charge for such lands shall be increased 5 per cent each year until such application is made and an initial installment paid.

6. **Advance payment of construction charge permissible.**—A water-right applicant may at his option pay in advance the whole or any part of the construction charge owing by him within any shorter period than that prescribed by this notice.

7. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice shall be of the same amount as for other like lands under the said project. Such charge will be due and payable on March 1 of each year for the preceding irrigation season; but where water-right application is made for land in private ownership after August 1, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

8. **Place and manner of payment of water charges.**—All water-right charges must be paid at the office of the United States Reclamation Service at Fallon, Nev., in cash or by New York draft, or money order, payable to the special fiscal agent, United States Reclamation Service.

S. G. HOPKINS,
Assistant Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Truckee-Carson project, June 30, 1918.

Cash		$16.317,74
Inventory of stock on hand		31.861.43
Accounts receivable		867,034.15
Construction cost	$6,216,634.72	
Less construction revenue earnings	17,175.38	
		6,199,459.34
Operation and maintenance cost	526,973.81	
Less operation and maintenance earnings	11,782.95	
		515,190.86
Total		7,629,863.52
Accounts payable		47,548.99
Contingent obligations		16,317.74
Reserves for repayment to reclamation fund of cost of project		1,553,888.44
Capital investment:		
Disbursement, transfer, and joint-construction vouchers received	$6,922,718.90	
Collection, transfer, refund, and joint-construction vouchers issued	910,610.55	
Net investment		6,012,108.35
Total		7,629,863.52

Feature costs of Truckee-Carson project to June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys:		
Examination, general	$3,215.46	$206,121.46
Lahonton Valley	1,643.05	2,341.80
Reno Valley	8,050.32	31,573.57
Carson Valley	6,746.79	6,746.79
Lake Tahoe Reservoir	499.57	2,333.60
Stream gauging	....	24,480.72
	20,155.19	273,597.94
Storage works:		
Lahontan Dam and Reservoir	[1] 35,564.66	1,396,536.73
Lahontan Dam gate repair	8,371.48	8,371.48
Lahontan Dam spillway	9,218.98	9,218.98
Lake Tahoe Dam and Reservoir	7.50	161,026.65
Lake Tahoe Dam and Reservoir (shore line survey)	1,957.01	1,957.01
	[1] 16,009.69	1,577,110.85

[1] Deduct.

Feature costs of Truckee-Carson project to June 30, 1918—Continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Canal system:		
Main canals		$448,616.00
Carson diversion dam		91,776.84
Power house drop V line		62,487.63
Truckee Canal		1,583,827.65
Truckee concrete chute		29,095.60
Lahontan Bench Canal, section 1		20,584.29
A. A. Canal surveys	$53.66	53.66
A. A. Canal enlarging and cleaning	2,541.69	2,541.69
A. A. Canal, minor structures	1,249.85	1,249.85
V Canal turnout	677.22	677.22
Truckee Canal vitrified pipe turnout	1,569.17	1,569.17
Truckee Canal turnout, station 1049	551.49	551.49
Truckee Canal check below KE lateral	3,235.69	3,235.69
Truckee Canal surveys	1,142.19	1,142.19
	11,020.96	2,247,408.97
Lateral system:		
Truckee Canal laterals	1,872.34	88,911.50
V line laterals	12,313.80	12,510.48
T line laterals	1,664.20	128,874.21
S line laterals	[1] 401.60	282,725.00
AA line laterals	[1] 2,571.16	301,073.58
D line laterals	[1] 68.51	110,604.13
L line laterals	[1] 225.33	176,247.48
Primary laterals (1905 and 1906)		48,888.18
Fernley pipe line	26,812.55	26,812.55
J system waste water ditches	5,330.77	5,330.77
	44,727.06	1,181,977.88
Drainage system:		
Deep drainage system		31,397.75
Lateral and drainage system	230.86	244,580.00
Drainage investigations	3,757.22	7,275.12
Carson Lake drain		3,707.85
Inman mill right		8,038.46
AD drain extension		5,005.87
BAD drain	[1] 230.86	685.24
Harmon drain	[1] 2,740.55	2,355.75
Fernley drain	24,162.72	24,162.72
Deepening J1 drain	30.47	30.47
	25,209.86	327,239.23
Flood protection: Carson River channel		131,821.37
Power system:		
Commercial power system		26,346.65
Lahontan power plant	2,377.32	138,511.52
	2,377.32	164,858.17
Farm units:		
Farm unit subdivision, miscellaneous		3,890.19
Property and structure maps		4,233.36
Irrigable lands, District No. 1	5,887.66	6,289.33
Irrigable lands, District No. 2	156.35	3,986.92
Irrigable lands, District No. 7	3,276.95	4,979.52
Irrigable lands, Districts Nos. 3, 4, and 5	[1] 4,143.50	
Leveling farm lands	[1] 197.21	
Carson Lake farm	33,695.64	40,141.94
Land preparation under contract: John P. Green	844.01	844.01
Land preparation under contract: Fred Steinbrook	2,525.28	2,525.28
Irrigable lands: Water rights	1,372.08	1,372.08
	43,417.26	68,262.63
Permanent improvements:		
Experimental farm		7,008.44
Headquarters and permanent buildings	[1] 160.00	13,716.21
Ditch tenders' houses		22,505.08
Rights of way and land purchases		63,052.76
Rights of way and land donated		1,533.34
Addition to office building	3,285.40	4,965.45

[1] Deduct.

Feature costs of Truckee-Carson project to June 30, 1918—Continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30,1918.
Permanent improvements—Continued.		
Lake Tahoe house	$35.58	$77.85
Ditch riders' house, Island district	837.73	837.73
Garage buildings	1,235.77	1,235.77
Ditch rider's house, Soda Lake district	2,726.00	2,726.00
Improvements to ditch rider's house	38.71	38.71
Government stock pasture	247.19	247.19
	8,246.38	117,944.53
Telephone system:		
Telephone system		42,377.85
Telephone system extension	137.81	137.81
	137.81	42,515.66
Balance in plant accounts	41,520.61	81,874.56
Operation and maintenance charges transferred to and compounded with construction charges		2,022.93
Gross construction cost to June 30, 1918	180,802.76	6,216,634.72
Less revenues earned during construction period:		
Rental of buildings		17,684.11
Rental of grazing and farming lands	23.62	20,037.18
Contractors' freight refunds		412.07
Loss on hospital operations	413.17	[1] 2,049.62
Other losses on operations, unclassified	[1] 18,908.36	[1] 18,908.36
	[1] 18,471.57	17,175.38
Net cost		6,199,459.34

[1] Deduct.

Statement of costs, by calendar years, Truckee-Carson project.

Year ending Dec. 31—	Construction.	Operation and maintenance under public notice.	Total cost.
1907	[1] $3,722,316.15	$90,431.57	$3,812,747.72
1908	17,221.04	60,177.33	77,398.37
1909	[2] 976.89	113,002.14	112,025.25
1910	80,572.19	39,188.87	119,761.06
1911	365,373.25	48,325.21	413,698.46
1912	668,324.06	[2] 108,989.11	559,334.95
1913	467,588.32	53,331.13	520,919.45
1914	456,192.82	45,902.61	502,095.43
1915	173,952.21	49,107.20	223,059.41
1916	20,803.36	49,797.38	70,600.74
1917	73,784.50	48,025.03	121,809.53
January to June 30, 1918	87,586.22	40,697.38	128,283.60
Plant accounts on June 30, 1918	81,874.56		81,874.56
Operation and maintenance transferred to construction	2,022.93	[2] 2,022.93	
Total	6,216,634.72	526,973.81	6,743,608.53

[1] Includes prior years.

[2] Deduct.

Statement of costs, by fiscal years, Truckee-Carson project.

Year ending June 30—	Construction.	Operation and maintenance under public notice.	Total cost.
1907	[1]$3,573,134.35	$67,105.07	$3,640,239.42
1908	242,801.86	57,716.00	300,517.86
1909	[2]107,049.46	124,056.40	17,006.94
1910	69,945.22	34,870.69	104,815.91
1911	138,866.51	47,123.04	185,989.55
1912	671,617.45	[2]110,122.29	561,495.16
1913	454,587.53	52,354.98	506,942.51
1914	514,930.03	44,610.78	559,540.81
1915	400,371.22	46,313.22	446,684.44
1916	[2]12,359.92	51,996.84	39,636.92
1917	46,610.29	33,181.45	79,791.74
1918	180,802.76	79,790.56	260,593.32
Plant accounts on June 30, 1917	40,353.95	....	40,353.95
Operation and maintenance transferred to construction	2,022.93	[2]2,022.93	....
Total	6,216,634.72	526,973.81	6,743,608.53

[1] Includes prior years.

[2] Deduct.

Estimated cost of contemplated work, Truckee-Carson project, during fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys:		
Stream gauging (not operation and maintenance)	$1,000	
Truckee River water-right adjudication	9,250	
Upper Carson unit, surveys and investigations	15,250	$25,500
Storage system:		
Lake Tahoe, right of way, acquirement of rights and property	60,000	
Channel improvement on Truckee River, Lake Tahoe outlet	33,200	
Survey of Lake Tahoe riparian lands	10,250	
Lahontan Reservoir, improvements to Lahonton Dam gates and spillways	20,550	124,000
Canal system: Truckee Canal improvements	....	53,250
Lateral system:		
Surveys for lateral extensions	5,400	
Construction, extension of lateral system	52,000	57,400
Drainage system:		
Open drains—		
Investigations and surveys for project deep drainage system	10,400	
Completion of Fernley drain	3,000	
Deepening J drain (Carson Lake)	6,600	20,000
Farm units:		
Surveys—		
Seeped and alkalied areas	1,100	
Irrigable area and farm unit	4,100	
Preparation of farm-unit plats	2,000	
Leveling and clearing farm land	118,800	
Pasture operations—		
Carson Lake pasture	7,600	
District No. 3 pasture	8,700	142,300
Permanent improvements, real estate:		
Buildings—Permanent shops, maintenance headquarters, and warehouses at Fallon	18,200	
Ditch-rider's station, Island district	3,000	21,200
Telephone system	....	3,100
Operation and maintenance (public notice):		
Operation	35,900	
Maintenance	70,350	106,250
Total all features	....	553,000

Operating costs and revenues, Truckee-Carson project, to June 30, 1918.

EXPENSES.

Feature.	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works:						
Lake Tahoe Reservoir	$353.90	$15.02	$368.92	$3,580.25	$56.74	$3,636.99
Lahontan Dam	3,521.70	1,883.84	5,405.54	7,911.18	3,892.73	11,803.91
	3,875.60	1,898.86	5,774.46	11,491.43	3,949.47	15,440.90
Canal systems:						
Truckee Canal	540.21	[1] 437.58	102.63	12,718.36	21,357.23	34,075.59
V line canal	2,104.62	3,013.29	5,117.91	13,702.16	19,992.14	33,694.30
T line canal	533.60	6,092.86	6,626.46	1,438.55	8,953.54	10,392.09
	3,178.43	8,668.57	11,847.00	27,859.07	50,302.91	78,161.98
Lateral system:						
Truckee canal district	2,499.61	20,554.74	23,054.35	18,508.41	51,077.40	69,585.81
V line district	7,034.69	24,255.83	31,290.52	93,494.39	161,303.56	254,797.95
T line district	761.53	4,298.17	5,059.70	16,693.78	37,290.62	53,984.40
	10,295.83	49,108.74	59,404.57	128,696.58	249,671.58	378,368.16
Drainage system:						
V district surface drains	....	1,046.23	1,046.23	629.01	43,005.33	43,634.34
T district surface drains	....	78.34	78.34	....	5,089.76	5,089.76
V district, subsurface	....	493.26	493.26	717.29	1,070.99	1,788.28
	....	1,617.83	1,617.83	1,346.30	49,166.08	50,512.38
Flood protection: Carson River channel	....	....	....	....	2,148.77	2,148.77
Undistributed expenses:						
Power system	....	[1] 13.40	[1] 13.40	....	....	....
Maintenance, ditch riders' houses	....	1,160.10	1,160.10	....	1,977.58	1,977.58
Betterment, year 1914, charged to maintenance	....	....	....	....	2,386.97	2,386.97
Gross cost	....	1,146.70	1,146.70	....	4,364.55	4,364.55
	17,349.86	62,440.70	79,790.56	169,393.38	359,603.36	528,996.74
Less accrued and unpaid operation and maintenance accruals transferred to and added to construction charges	....	....	....	....	....	[1] 2,022.93
Net cost	17,349.86	62,440.70	79,790.56	169,393.38	359,603.36	526,973.81

[1] Deduct.

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$42,156.78	$299,427.37
Operation and maintenance charges paid in advance by water-right applicants	[1] 108.83	129.70
Operation and maintenance charges paid and forfeited by water-right applicants	15.00	1,255.87
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	1,005.81	2,951.38
Rental of land and buildings during operating period	1,426.50	2,596.17
Rentals of irrigation water	1,802.96	8,281.70
Other revenues unclassified, earned during operating period	77.58	905.08
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants	[1] 1,200.55	[1] 3,149.60
Total	45,175.25	312,397.67
Difference (deficit)	34,615.31	214,576.14

[1] Deduct.

NEW MEXICO, CARLSBAD PROJECT.

L. E. FOSTER, project manager, Carlsbad, N. Mex.

LOCATION.

County: Eddy.

Townships: 18 to 24 S., Rs. 25 to 29 E., New Mexico meridian.

Railroad: Atchison, Topeka & Santa Fe System.

Railroad stations and estimated population June 30, 1918: Carlsbad, 3,000; Otis, 25; Loving, 200; Malaga, 75.

WATER SUPPLY.

Source of water supply: Pecos River.

Area of drainage basin: 22,000 square miles.

Annual run-off in acre-feet of Pecos River at Carlsbad and Dayton (22,000 square miles) 1899 to 1917: Maximum, 912,000; minimum, 148,000; mean, 319,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1918: 24,775 acres.

Area under water-right applications, season of 1918: 23,383 acres.

Length of irrigating season: From March to November and two weeks in winter, 260 days.

Average elevation of irrigable area: 3,100 feet above sea level.

Rainfall on irrigable area: 1901–1917, average 14.66 inches; 1917, 5.73 inches.

Range of temperature on irrigable area: —5° to 110° F.

Character of soil of irrigable area: Pecos sandy loam with large lime content.

Principal products: Alfalfa, cotton, grain crops, melons, peaches, pears, and miscellaneous fruits.

Principal markets: Carlsbad, N. Mex.; Denver, Colo.; Chicago, Ill.; Kansas City, Mo.; Texas cities; New York, N. Y.

LANDS OPENED FOR IRRIGATION.

Dates of public notices: December 17, 1907; November 30, 1908; June 2, November 17, 1909; October 7, 1910; March 13, 1911; February 17, 1912; March 2, April 10, 1915; February 24, September 2, 1916; March 9, 1917; March 12, 1918.

Location of lands opened: Ts. 21, 22, 23, and 24 S., Rs. 26, 27, 28, and 29 E., New Mexico meridian.

Duty of water: 2.33 acre-feet per acre per annum at the farm, 1917.

Building charge per acre of irrigable land: $31, $45, $55, and $60.

Annual operation and maintenance charges on graduated scale according to use. For 1918, first acre-foot, $1.15; second acre-foot, 10 cents; third acre-foot, 15 cents; fourth acre-foot, 50 cents; additional acre-feet, 75 cents per acre-foot. Waste water furnished from January 1 to March 10, 1918, at 15 cents per acre-foot.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1904.

Construction recommended by board of engineers August 31, 1905.

Construction authorized by Secretary February 24, 1906.

Canal system of Pecos Irrigation Co. purchased February, 1906.

First irrigation by Reclamation Service, season 1907.

Construction completed at Avalon diversion, 1912.

Project 91 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Carlsbad project provides for the storage of water in Lake McMillan, on Pecos River, near Lakewood, N. Mex., and in a storage and distributing reservoir on the same river near Carlsbad, N. Mex., controlled by Avalon Dam; and the diversion of water from Avalon Reservoir into a canal system, watering lands on both sides of Pecos River, in the vicinity of Carlsbad. The United States claims all waste, seepage, unappropriated spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The major construction features of the project were completed in 1912, the principal of which are: The Avalon Dam, which has a concrete core wall; McMillan, an earth and rock fill dam, which was built by private capital, antedating Government control; a concrete flume spanning the Pecos River, with 4 arches of 100 feet each; a reinforced concrete siphon, under Dark Canyon, 6 feet in diameter, originally 400 feet long, which was lengthened to 600 feet in 1916; about 50 miles of canals and laterals (exclusive of sublaterals and ditches); a concrete head-gate structure at each of the dams, and two spillway tunnels driven through rock, each 21 feet in diameter, lined with concrete, aggregating 200 feet in length, equipped with heavy cylindrical gates operated by turbines (replacing concrete spillway equipped with wooden emergency gates, spillway having been closed with concrete); and a reinforced concrete circular spillway 393 feet long. All check gates, spillways, and head-gate structures on the canals and all turnouts on the laterals are of concrete construction.

SUMMARY OF GENERAL DATA FOR CARLSBAD PROJECT TO END OF FISCAL YEAR, 1918.

Areas:			
Irrigable acreage when project is complete			24,775
Public land entered to end of fiscal year		166	
State land		1,220	
Private land		23,389	
Acreage service could have supplied season of 1917			24,775
Estimated acreage service can supply July 1, 1919			24,775
Acreage actually irrigated, season of 1917			16,882
Acreage cropped under irrigation, season of 1917			15,729
Crops:			
Value of irrigated crops, season of 1917			$623,818.00
Value of irrigated crops, per acre cropped			39.66
Finances:			
Net construction cost to end of fiscal year			$1,386,417.07
Per cent complete at end of fiscal year			91
Appropriated for fiscal year 1919, total			$75,000.00
Allotment for construction, fiscal year 1919			$3,000.00
Estimated per cent complete, June 30, 1919			91
Proposed appropriaton, fiscal year 1920, for construction			$40,000.00
Estimated gross construction expenditures to June 30, 1920			$1,441,000.00
Estimated per cent complete, June 30, 1920			93
Announced construction charges per acre			$31,$45,$55,$60
Appropriation, fiscal year 1918		[1] 76,200.00	
Increase under 10 per cent provision of act		6,400.00	
Total appropriation			$82,600.00
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$72,779.66		
Transfers	384.32		
		$73,163.98	
Registered liabilities chargeable to 1918 appropriation		$9,236.12	
			$82,400.10
Unencumbered balance, July 1, 1918			199.90
Repayments:			
Value of construction water-right contracts			$1,305,700.00
Construction charges—			
Accrued to end of fiscal year			188,207.71
Collected to end of fiscal year			180,587.57
Uncollected at end of fiscal year			7,620.14

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[1] Includes refunds authorized to be added to 1918 appropriation by sundry civil act of June 12, 1917, and amounts allotted from appropriation for increased compensation for 1918.

Repayment—Continued.	
Operation and maintenance charges (public notice)—	
Accrued to end of fiscal year	$209,176.18
Collected to end of fiscal year	197,194.34
Uncollected at end of fiscal year	11,981.84
Water-rental charges—	
Accrued to end of fiscal year	$14,377.43
Collected to end of fiscal year	14,249.03
Uncollected at end of fiscal year	128.40
Drainage:	
Estimated acreage damaged by seepage to end of fiscal year	555
Miles of drains built to end of fiscal year—	
Open	13.15
Closed	3.74
Total	16.89
Estimated acreage protected by drains built to end of fiscal year	5,058
Estimated acreage to be protected by authorized system	5,500
Cost of drainage works to end of fiscal year	$130,472.07

CONSTRUCTION DURING FISCAL YEAR.

Construction work has been confined to drainage, and the necessary extension of the lateral system, including minor structures and structures required for the various open drains.

Drainage system.—Open drain E in the Otis district was completed July 25, 1917. Its total length is 10,800 feet, and the total yardage moved was 61,000 cubic yards. Results of building this drain have been quite pronounced in lowering the water table in the area affected, and good crops are now growing on this area, which was badly seeped and unfit for cultivation at the commencement of the work.

Open drain C–1, which is a tributary of drain C, was completed July 23, 1917. Excavation amounting to 2,841 cubic yards was removed with an Austin trenching machine. Slopes were cut by hand with shovels, the machine taking out the excavated material. For a period of about six months a well rig was employed on drains C and C–1 drilling through a conglomerate ledge to gravel, under which were water-bearing strata. A good flow of water was obtained in most of these wells, without which it would have been practically impossible to drain this area. The acreage tributary to drains C and C–1 is now in good condition, with crops growing thereon.

Closed drain G in the Hughes area near Loving, N. Mex., was started on August 27, 1917, and completed at the end of November. This drain is 6,500 feet long; excavation was removed with an Austin trenching machine. The bottom of the drain is in semigypsum clay; the tile was laid and then entirely covered with coarse gravel before back fill was made. After the completion of this drain, the water table was materially lowered.

Work was resumed at station 63 on open drain D on September 27, 1917. The Monighan drag-line excavator was employed to excavate this drain, and was still working at the end of the fiscal year. On June 30, the drain was completed to station 214, with about 3,500 feet of ditch yet to complete. In the greater part of this drain hard material was encountered, which required breaking with powder, thus materially increasing the cost of the excavation.

At the crossing of the Atchison, Topeka & Santa Fe Railway track, two lines of 36-inch concrete pipe, each 48 feet in length, were laid, and concrete head walls were constructed. Four crossings at public highways were constructed. These culverts consisted of 4 sections of corrugated metal pipe, each 5 by 26 feet, with concrete head walls extending to within 6 inches of the crown of the roadbed.

Lateral system.—Approximately 6 miles of lateral extensions were made in various parts of the project. These extensions were built to accommodate new lands admitted under the second unit. A number of concrete turn-outs and weirs were also constructed at the high points of the farm units served.

SEEPAGE AND DRAINAGE.

Seepage conditions have shown a marked improvement over the past few years. This is largely due to concrete lining and the construction of drains. However, in certain seeped areas where drains have not yet been built, the water table has been low on account of small precipitation and greatly curtailed water delivery for about 60 days during the summer of 1917. The water table over the area tributary to drains A, B, and C has been lowered materially.

Construction and operation and maintenance charges have been suspended on 60 acres of irrigable land due to seepage conditions.

OPERATION AND MAINTENANCE.

The spring of 1917 was characterized by a great deal of cool weather. A severe frost on May 7 killed all the fruit and materially damaged the young cotton and alfalfa. An insufficient water supply at a critical time in the development of the cotton, and a belated irrigation after growth had been checked, resulted in a large undeveloped crop, a considerable percentage of which was marketed as bollies which brought about 3 cents per pound.

The water supply during the season was meager, the storage having been entirely depleted by May 27. The total run-off of the Pecos River amounted to 136,500 acre-feet for the calendar year 1917, which was below normal during the winter and up to the end of the fiscal year 1918. The spring season of 1918 was similar to the previous spring. The reservoirs were entirely depleted of storage at the end of June, 1918.

Maintenance work consisted of the usual cleaning of the canals and laterals of weeds and grass. The west bank of the main canal at Avalon was repaired and strengthened to correct the flood damage of the previous year. A temporary embankment was built across spillway No. 1 at Avalon to permit the storage of additional water. Grass and moss in the open drains made it necessary to clean them thoroughly during the fall of 1917 and again in the early summer of 1918.

Historical review, Carlsbad project.

Item.	1913	1914	1915	1916	1917	1918
Acreage for which service was prepared to supply water	20,261	20,261	24,796	24,775	24,775	24,775
Acreage irrigated	14,260	12,740	13,470	16,600	16,882	20.000
Miles of canal operated	45	45	45	45	45	45
Water diverted (acre-feet)	86,560	87,900	79,530	[1] 415,100	136,500	....
Water delivered to land (acre-feet)	33,044	30,900	28,857	40,382	39,589	....
Per acre of land irrigated (acre-feet)	2.30	2.44	2.14	2.43	2.33	....

[1] Former years reported on basis of diversion at headquarters.

SETTLEMENT.

A considerable acreage of raw lands has been sold during the past year to local farmers, nearly all of which has been cleared, leveled, and planted to crops. The total acreage in crops at the close of the fiscal year amounted to 19,786 acres, or an increase of 2,904 acres over the year 1917. More permanent improvements have been made during the past year than at any time during the history of the project. About 500 acres of State lands were brought in under the second unit and put under cultivation during the fiscal year.

Settlement data, Carlsbad project.

Item.	1912	1913	1914	1915	1916	1917
Total number of farms on project	[1] 521	[1] 519	[1] 524	[1] 616	[1] 690	[1] 693
Population	675	940	950	950	634	992
Number of irrigated farms	345	362	362	390	455	535
Operated by owners or managers	[2] 145	[2] 224	[2] 240	[2] 280	[2] 167	[2] 190
Operated by tenants	[2] 200	[2] 138	[2] 122	[2] 110	[2] 83	[2] 245
Population	650	910	925	541	634	992
Number of towns	4	4	4	4	4	4
Population	3,000	3,100	3,200	3,000	3,300	3,300
Total population in towns and on farms	3,675	4,040	4,150	3,950	3,934	4,292
Number of public schools	7	7	7	7	7	7
Number of churches	8	8	8	8	8	8
Number of banks	2	2	2	2	3	3
Total capital stock	$80,000	$80,000	$80,000	$80,000	$225,000	$275,000
Amount of deposits	....	....	$547,000	$687,000	$1,243,316	$1,271,266
Number of depositors	....	....	1,400	1,484	2,138	1,941

[1] Water-right applicants.

[2] Many farms were operated by 1 man.

PRINCIPAL CROPS.

The two principal crops of the season of 1917 and 1918 were alfalfa and cotton. During both seasons the yield of the first crops of alfalfa was late and was seriously affected by late frosts. An insufficient water supply at a critical time in the development of the cotton crop of 1917 resulted in a serious curtailment of the yield. Prices for all crops were good, and in spite of the small yield the total gross money value for 1917 was $39.66 per acre, $10.97 higher than the previous year. Stored alfalfa sold during the winter months for $35 to $40 per ton. The total acreage planted to cotton in 1918 was 7,955 acres, or an increase of 100 per cent over previous years. This crop was in very good condition, both as to stand and development of the plant, at the end of the fiscal year. On account of the water shortage much of the second cutting of alfalfa was left for seed.

Crop report, Carlsbad project, New Mexico, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	5,556	Ton	9,762	1.8	$21.96	$214,444	$38.59
Alfalfa seed	2,113	Pound	392,534	186	.14	56,378	26.67
Barley	120	Bushel	926	7.7	2.19	2,032	16.93
Beans	118	Pound	29,530	250	.09	2,789	23.63
Cane	428	Ton	866	2	17.86	15,476	36.14
Corn, Indian	729	Bushel	11,947	16.4	1.59	18,998	26.06
Corn, sorghum	221	Pound	272,500	1,233	.03	8,566	38.76
Corn, fodder	707	Ton	787	1	11.31	8,903	12.59
Cotton	[1] 4,015	Pound	754,987	188	.24	185,072	46.10
Cotton seed	[1] 3,677	...do	1,212,480	329	.03	37,438	10.19
Garden	32					2,363	73.71
Hay, mixed	643	Ton	237	.4	17.90	4,244	6.60
Oats	423	Bushel	6,021	14.2	.95	5,744	13.58
Pasture	4,175					32,550	7.79
Potatoes, sweet	5	Bushel	398	79.6	2.40	955	191.00
Rye	15	...do	195	13	1.80	351	23.40
Wheat	1,459	...do	13,738	9.4	2.00	27,515	18.86
Less duplicated areas	8,707						
Total cropped	15,729	Total and average				623,818	39.66

		Areas.	Acres.	Farms.	Per cent of project.
Fall seeding:		Total irrigable area farms reported	22,787	535	92
Alfalfa	111	Total irrigated area farms reported	16,882	535	68
Oats	27	Under water-right applications	16,882	535	68
Wheat	1,736	Total cropped area farms reported	15,729	535	63
No crop	725				
Less duplicated areas	1,446				
Total irrigated	16,882				

[1] Cotton on 338 acres sold in field before ginning.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, MARCH 12, 1918.

1. **Annual operation and maintenance charges.**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice against all lands of the Carlsbad project, New Mexico, under public notice, shall be a minimum charge of $1.15 per irrigable acre, whether water is used thereon or not, which charge will permit the delivery of not to exceed 1 acre-foot of water per irrigable acre; for the first acre-foot per irrigable acre additional the charge shall be 10 cents per acre-foot; for the second acre-foot per irrigable acre additional, 15 cents; for the third acre-foot per irrigable acre additional, 50 cents; and for further quantities 75 cents per acre-foot. An additional charge of 15 cents an acre-foot will be made for water used in the winter season beginning at the close of the irrigation season and ending March 10, which water would otherwise waste over the spillways at Lake Avalon. All operation and maintenance charges will be due and payable on March 1 of each year for the preceding irrigation season.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Carlsbad project, June 30, 1918.

Cash		$771.20
Inventory of stock on hand		10,519.72
Accounts receivable		1,139,046.63
Construction cost	$1,398,060.73	
Less construction revenue earnings	11,643.66	
		1,386,417.07
Operation and maintenance cost	233,958.28	
Less operation and maintenance revenue earnings	14,166.83	
		219,791.45
Total		2,756,546.07
Accounts payable		9,266.93
Contingent obligations		771.20
Reserves for repayment to reclamation fund of cost of project		1,522,609.58
Miscellaneous accruals		1,526.54
Captial investment:		
Disbursement, transfer, and joint construction vouchers received	$1,660,878.46	
Collection, transfer, refund, and joint construction vouchers issued	438,506.64	
Net investment		1,222,371.82
Total		2,756,546.07

Feature costs of Carlsbad project to June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys: Preliminary surveys, etc		$41,081.56
Storage system:		
McMillan Reservoir—		
Preliminary surveys, etc		6,718.62
Rights of way and lands for flowage	$98,384.53	105,769.09
Dam, spillways, outlet works, headworks	[1] 966.02	228,528.91
Avalon Reservoir—Dam, spillways, outlet works		315,989.46
Third Reservoir.—Preliminary surveys, etc		3,146.33
Total, storage system	97,418.51	660,152.41
Canal system:		
Main canal, (concrete lined 11.67 miles)		187,828.96
East canal		9,436.95
Black River cut-off canal		17,229.17
Black River canal		25,596.48
Flumes		21,354.99
Dark Canyon siphon		31,333.47
Wasteways, etc		29,621.29
Total, canal system		322,401.31
Lateral system:		
Laterals, excavation	1,913.85	32,513.36
Laterals, concrete lining		3,171.69
Minor structures, concrete	4,877.66	26,751.75
Minor structures, timber	451.10	1,457.43
Flume, near Avalon Dam		912.49
Siphon, near Avalon Dam		5,378.37
Total, lateral system	7,242.61	70,180.09
Drainage system:		
Preliminary surveys, etc		3,959.51
Open drains	32,516.51	81,698.00
Closed drains	6,935.64	44,814.56
Total, drainage system	39,452.15	130,472.07
Permanent improvements:		
Real estate (P. I. & I. Co., plant)		152,057.31
Buildings		3,192.19
Total, permanent improvements		155,249.50
Balance in plant accounts (equipment)	367.24	16,589.79

[1] Deduct.

Feature costs of Carlsbad project to June 30, 1918—Continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Operation and maintenance charges transferred to and compounded with construction charges	....	$1,934.00
Gross construction cost to June 30, 1918	$144,480.51	1,398,060.73
Less revenues earned during construction period:		
Rentals of buildings	77.50	795.70
Rentals of irrigation water	....	8,163.35
Contractors freight refunds	[1] 21.00	197.33
Other revenues, unclassified	22.40	2,607.34
Loss on hospital operations	[1] 27.14	[1] 120.06
Total, revenues	51.76	11,643.66
Net cost of construction of project to June 30, 1918	....	1,386,417.07

[1] Deduct.

Statement of cost by calendar years, Carlsbad project.

Year ending Dec. 31—	Construction.	Operation and maintenance under public notice.	Total cost.
1905[1]	[2] $24,713.44	....	$24,713.44
1906	[2] 326,675.09	....	326,675.09
1907	192,504.28	....	192,504.28
1908	48,225.11	$16,631.26	64,856.37
1909	16,397.25	19,084.71	35,481.96
1910	[3] 3,067.28	16,431.73	13,364.45
1911	239.30	17,607.26	17,846.56
1912	216,129.72	20,169.15	236,298.87
1913	39,589.28	23,387.88	62,977.16
1914	72,434.77	18,771.86	91,206.63
1915	89,152.49	26,686.92	115,839.41
1916	102,397.85	25,549.51	127,947.36
1917	144,081.91	29,239.58	173,321.49
January 1 to June 30, 1918	111,997.73	20,398.42	132,396.15
Plant account to June 30, 1918	16,589.79	....	16,589.79
Total	1,398,060.73	233,958.28	1,632,019.01

[1] 1902-1905. [3] Deduct. [2] Estimated.

Statement of cost by fiscal years, Carlsbad project.

Year ending June 30—	Construction.	Operation and maintenance under public notice.	Total cost.
1905[1]	[2] $9,000.00	....	$9,090.00
1906	[2] 241,000.00	....	241,000.00
1907	224,347.53	....	224,347.53
1908	103,888.41	[3] $11,705.08	92,183.33
1909	15,057.01	32,734.88	47,791.89
1910	11,445.67	19,958.61	31,404.28
1911	948.57	[3] 11,480.63	[3] 10,532.06
1912	201,198.67	46,691.31	247,889.98
1913	29,819.27	26,760.31	56,579.58
1914	57,094.49	23,662.81	80,757.30
1915	89,863.26	23,734.57	113,597.83
1916	81,538.97	22,283.25	103,822.22
1917	172,155.82	26,290.58	198,446.40
1918	144,480.51	35,027.67	179,508.18
Plant account to June 30, 1917	16,222.55	....	16,222.55
Total	1,398,060.73	233,958.28	1,632,019.01

[1] 1902-1905. [2] Estimated. [3] Deduct.

Estimated cost of contemplated work, Carlsbad project, fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919 (principal feature).
Drainage system: Open drains—Drain D, completion of	$3,000.00
Operation and maintenance under public notice	32,000.00
Total	35,000.00

Operating expenses and revenues, Carlsbad project, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works:						
McMillan Reservoir—Dam, East and West embankments, spillways, and headworks	$3,035.97	$8.55	$3,044.52	$9,824.49	$27.66	$9,852.15
Right of way and lands		3,858.30	3,858.30		3,858.30	3,858.30
Avalon Reservoir—Dam, spillways, and headworks	1,986.09	350.99	2,337.08	4,030.50	713.03	4,743.53
	5,022.06	4,217.84	9,239.90	13,854.99	4,598.99	18,453.98
Canal, and lateral system: Main, East, Black River, and Black River cut-off canals and structures; flumes; Dark Canyon siphon; all laterals and structures	5,185.81	11,022.73	16,208.54	62,196.40	132,009.12	194,205.52
Drainage system:						
Open drains: B, C, C-1, D, E, F		715.48	715.48		1,514.55	1,514.55
Closed drains: A, D-1, G		160.50	160.50		900.05	900.05
		875.98	875.98		2,414.60	2,414.60
Undistributed expenses:						
Hydrometry	1,588.85		1,588.85	1,588.85		1,588.85
Buildings and fences		611.83	611.83		7,018.00	7,018.00
Roads					454.58	454.58
Farms					1,870.81	1,870.81
General expense	1,370.73	5,131.84	6,502.57	2,095.94	7,790.00	9,885.94
	2,959.58	5,743.67	8,703.25	3,684.79	17,133.39	20,818.18
Subtotal, operation and maintenance	13,167.45	21,860.22	35,027.67	79,736.18	156,156.10	235,892.28
Less unpaid operation and maintenance charges added to construction						1,934.00
Total	13,167.45	21,860.22	35,027.67	79,736.18	156,156.10	233,958.28

Operating expenses and revenues, Carlsbad project, to June 30, 1918—Continued.

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$23,917.75	$208,728.18
Operation and maintenance charges paid in advance by water-right applicants	[1] 41.55	308.95
Operation and maintenance charges paid and forfeited by water-right applicants	....	151.05
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	2,008.20	3,804.75
Rental of land and buildings during operating period	818.92	4,742.07
Rentals of irrigation water	343.80	6,214.08
Other revenues unclassified, earned during operating period	207.44	2,698.68
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants (contra)	[1] 642.63	[1] 1,407.45
Total	26,606.93	225,240.31
Difference—deficit	8,420.74	8,717.97

[1] Deduct.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

L. M. LAWSON, project manager, El Paso, Tex.

LOCATION.

Counties: Socorro, Sierra, Dona Ana, N. Mex.; El Paso, Tex.

Townships: 8 to 29 S., Rs. 3 E. to 5 W., New Mexico meridian.

Railroads: Atchison, Topeka & Santa Fe, El Paso & Southwestern, Southern Pacific, and Texas & Pacific.

Railroad stations and estimated population, June 30, 1918: Texas—El Paso, 75,000; Ysleta, 500; La Tuna, 325; Fabens, 500; Canutillo, 275; Clint, 500; Vinton, 25; Belen, 20. New Mexico—Las Cruces, 4,500; Mesilla Park, 850; Rincon, 400; Dona Ana, 250; Engle, 120; Bernio, 50; Fort Selden, 25; Hatch, 200; Hill, 50; Leasburg, 25; Mesquite, 50; and Vado, 50.

WATER SUPPLY.

Source of water supply: Rio Grande.

Area of drainage basin: 37,000 square miles.

Annual run-off in acre-feet of Rio Grande: At San Marcial (30,000 square miles), 1895 to 1917, inclusive, maximum, 2,422,000; minimum, 200,700; mean, 1,158,329. At El Paso, Tex. (38,600 square miles), 1889 to 1914, inclusive, maximum, 2,010,000; minimum, 50,700; mean, 925,400. Data since 1914 at El Paso do not include run-off, as most of the surplus water is stored in Elephant Butte Reservoir.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1918: 90,000 acres.

Area under rental contracts, season of 1918: 69,889 acres.

Length of irrigating season: From February 15 to November 15—274 days.

Average elevation of irrigable area: 3,700 feet above sea level.

Rainfall on irrigable area: 32-year average, 10.61 inches; 1917, 6.49 inches.

Range of temperature on irrigable area: −5° to 105° F.

Character of soil of irrigable area: Fertile alluvium and sandy loam.

Principal products: Alfalfa, corn, wheat, melons, fruit, and vegetables.

Principal markets: Towns in Texas, New Mexico, and Louisiana, and eastern cities.

LANDS OPENED FOR IRRIGATION.

No lands have been opened for irrigation by public notice.

All lands in the Mesilla and El Paso Valleys are being irrigated under rental contracts.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in March, 1903.

Construction of Leasburg unit authorized December 2, 1905.

Reclamation act extended to Texas June 12, 1906 (34 Stat., 259).

Treaty with Mexico providing for distribution of waters of the Rio Grande proclaimed January 16, 1907.

Construction of Elephant Butte Dam authorized by Congress and $1,000,000 appropriated March 4, 1907 (34 Stat., 1357).

Leasburg unit completed July, 1908.

First irrigation by Reclamation Service (Leasburg unit), season of 1908.

Construction of Elephant Butte Dam authorized by Secretary May 23, 1910.

Construction plans of Elephant Butte Dam approved by board of engineers June 6, 1910, January 22, 1911, August 12, 1912, January 30, 1913.

Construction plans approved by Secretary October 26, 1910.

Franklin Canal purchased October, 1912.

First 11 miles of Franklin Canal reconstructed March, 1914; second section (8 miles) reconstructed 1915.

East Side Canal completed September, 1915.
West Side Canal completed November, 1915.
San Elizario feed canal completed April, 1916.
Elephant Butte Dam completed May 13, 1916.
Mesilla diversion dam completed May 31, 1916.
Leasburg extension canal and Picacho branch canal to station 121 completed May 31, 1916.
Percha Dam completed January, 1918.
Arrey Canal completed January, 1918.
Garfield flume completed February, 1918.
Garfield Canal construction begun June, 1917.
Hatch siphon construction begun January, 1918.
Hatch Canal construction begun February, 1918.
San Miguel Canal construction begun October, 1917.
Mesilla Valley, Nemexas drain begun August, 1917.
Mesilla Valley, west drain begun August, 1917.
Montoya headgate completed June, 1918.
Montoya Canal construction begun March, 1918.
Juan d'Herrera lateral district completed May, 1918.
San Elizario headgate completed May, 1918.
San Elizario main canal construction begun January, 1918.
El Paso Valley River and middle drains construction begun July, 1917.
Project, exclusive of Elephant Butte Dam, 40 per cent completed June 30, 1918.
Project, including Elephant Butte Dam ,66.4 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Rio Grande project provides for the storage of flood waters of the Rio Grande in a reservoir controlled by Elephant Butte Dam, about 12 miles west of Engle, N. Mex., and the diversion of water from the Rio Grande, about 24 miles below for watering lands in Rincon Valley; about 60 miles below for the irrigation of 28,000 acres in the upper Mesilla Valley under the Leasburg diversion dam; about 80 miles below for the irrigation of 57,000 acres in the lower Mesilla Valley under the Mesilla Dam; and about 120 miles below for supplying water to lands in El Paso Valley and furnishing 60,000 acre-feet per annum for use on land in El Paso Valley on the Mexican side of the Rio Grande. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith. All irrigation works required for Las Palomas and Rincon Valleys will be new; those for the Mesilla Valley include a diversion and 10.8 miles of canal now constructed, as well as a diversion dam 5½ miles southwest of Las Cruces and 27 miles of canal leading therefrom which have also been constructed; and those required for El Paso Valley will supplement and improve present canal systems.

The features of the above irrigation plan that have been completed are the Elephant Butte Dam, the Percha diversion dam, the Arrey Canal, the Garfield flume, the main portion of the Hatch main canal, the Leasburg diversion dam and Leasburg main canal, the Mesilla diversion dam and East and West Side Canals in the lower Mesilla Valley, the reconstruction of the major portion of the Franklin Canal and the construction of the San Elizario main canal headworks in the El Paso Valley. In addition, for the Montoya district in the lower east side of the Mesilla Valley, but in the Texas irrigation district, the intake works and main canal were begun and completed in the spring of 1918. The Hatch siphon and Garfield Canal connecting this structure with the Garfield flume were begun in 1918, and on June 30, were over 90 per cent completed. The construction of five main drains is also under way.

SUMMARY OF GENERAL DATA FOR RIO GRANDE PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:		
Irrigable acreage when project is complete		155,000
Public land entered to end of fiscal year	553	
Public land withdrawn at end of fiscal year	4,890	
State land	2,602	
Private land	146,955	
Acreage service could have supplied season of 1917		88,000
Addition in fiscal year 1918		2,000
Estimated addition in fiscal year 1919		8,000
Estimated acreage service can supply July 1, 1919		98,000
Acreage actually irrigated, season of 1917		64,308
Acreage cropped under irrigation, season of 1917		63,626

Crops:			
Value of irrigated crops, season of 1917			$3,598,424.00
Value of irrigated crops, per acre cropped			56.50
Finances:			
Net construction cost to end of fiscal year			$7,699,391.07
Per cent complete at end of fiscal year			66.4
Appropriated for fiscal year 1919, total			$1,296,000.00
Allotment for construction, fiscal year 1919			$1,346,000.00
Estimated per cent complete, June 30, 1919			77.3
Proposed appropriation, fiscal year, 1920, for construction			$1,161,900.00
Estimated gross construction expenditures to June 30, 1920			$10,658,700.00
Estimated per cent complete, June 30, 1920			90
Total appropriation fiscal year 1918			[1] $1,387,600.00
Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$984,534.68		
Transfers	46,675.20		
		$1,031,209.88	
Registered liabilities chargeable to 1918 appropriation		90,668.34	
Contract obligations wholly covered by 1918 appropriation		135,736.16	
Estimated engineering expenses on contract work wholly covered by 1918 appropriation			1,257,614.38
Unencumbered balance, July 1, 1918			129,985.62
Repayments:			
Water-rental charges—			
Accrued to end of fiscal year			420,703.63
Collected to end of fiscal year			375,612.07
Uncollected at end of fiscal year			45,091.56
Power earnings—			
Accrued to end of fiscal year			2,243.33
Collected to end of fiscal year			2,243.33
Drainage:			
Estimated acreage damaged by seepage to end of fiscal year			118,000
Miles of drains built to end of fiscal year: Open			44.8
Estimated acreage protected by drains built to end of fiscal year			20,500
Estimated acreage to be protected by authorized system			145,000
Cost of drainage works to end of fiscal year			$386,119.43

CONSTRUCTION DURING FISCAL YEAR.

The Percha diversion dam, described in the sixteenth annual report, and upon which construction work was begun in July, 1916, was completed for the beginning of the irrigation season in 1918. Early in the fall, the concrete work on this structure was completed, but the earth embankment across the river channel portion was left until the winter months, when water was not required for irrigation. This structure, which is located 27 miles from the nearest railroad point, contains about 4,500 yards of concrete and was built within the estimated cost.

Arrey Canal.—The construction of structures on the Arrey Canal by Government forces, which was begun in July, 1917, was completed in January, 1918, and the Percha Dam and Arrey Canal utilized for the diversion and carriage of water to certain lands in Rincon Valley.

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[1] Includes unexpended balance of 1917 appropriation and refunds authorized to be added to 1918 appropriation by sundry civil act of June 12, 1917.

Garfield Canal.—Contract was awarded for the construction of the Garfield Canal, and actual construction began in June, 1917. In September, the contractors, after performing a small portion of the construction work, relinquished the contract, and readvertisement and award were made. At the end of the fiscal year some work still remained to be performed on this delayed construction, and water deliveries through this canal, which had been expected during the fiscal year, were postponed until the season of 1919.

Garfield flume.—This structure, upon which construction work had begun during the fiscal year 1917, was completed by Government forces in February, 1918. It forms the connecting link between the Garfield Canal and the Hatch Canal. Although completed for the irrigation season of 1918, the contractor's delay on the Garfield Canal work prevented its use.

Hatch siphon.—Construction was begun on the Hatch siphon in January, 1918. This structure is a single barrel concrete siphon, 6 feet inside diameter, which will connect under the Rio Grande the lower end of the Garfield Canal and the Hatch Canal, and form an important connecting link in the main canal system for the Rincon Valley. On June 30, 1918, this structure was 90 per cent completed.

Hatch Canal.—The Hatch Community Canal, a small ditch located through the Hatch Valley, was deeded to the Government in December, 1917, to be utilized as part of the main canal system for the Rincon Valley, and reconstruction work was begun by contract when the irrigation season closed, the contracts being of such size as to enable the local water users to obtain the work. A large portion of this canal was completed before the 1918 irrigation season, and only a small part of the earthwork and structure work remained to be completed at the next opportunity for this work, when irrigation is closed for the winter months.

San Miguel Canal.—In carrying out the policy during the years 1914 and 1915 of constructing main canals in the Mesilla Valley to deliver water to communities, arrangements could not be concluded at that time to afford the La Mesa community a direct connection with the Government main canal. It received its water at this time through the San Miguel Community Ditch, operated by that community, and water deliveries were irregular and limited. Negotiations with the San Miguel community, carried on during the fall of 1917, resulted in this community ditch being turned over to the Reclamation Service to form part of the main canal system for the west side of the Mesilla Valley, and its reconstruction was begun and completed during the winter months without interference with the irrigation of lands.

Montoya headgate.—Water for this district of 3,000 or 4,000 acres, located in the lower portion of the Mesilla Valley, was supplied about June 1, 1918, by the construction of the Montoya headgate and main canal, begun in March, 1918.

San Elizario headworks.—The irrigation water supply for the lower portion of the El Paso Valley and the San Elizario Island tract is diverted from the Rio Grande at an intake structure located approximately 2 miles southeast of the town of Ysleta. This structure was completed in May, 1918, and pending the construction of the main canal, which utilizes a portion of the system already built, it diverted water for irrigation in the lower valley.

Lateral system.—No lateral construction work was performed in the Mesilla Valley portion of the New Mexico irrigation district during the fiscal year. The water users' association and irrigation district, together with the farm bureau, all adopted resolutions recommending the deeding of community canals to the Government for their reconstruction and operation. In the El Paso Valley, the Juan d'Herrera lateral district was completed in May, 1918, and during the winter season a large amount of reconstruction was performed on the community ditches taken over for rebuilding and operation by the Government. Practically all large community ditches have now been deeded to the Government, and such canals as remain in community ownership are of small size and length. During the latter part of the fiscal year, the Ysla lateral, the distributary for the Ysla community district, was advertised for construction by contract.

Drainage construction.—At the end of the fiscal year, 44.8 miles of open drain had been constructed in the project by Government forces, involving the excavation by machine of 1,830,000 cubic yards. Four new Bucyrus caterpillar drag-line machines were received at the beginning of the fiscal year and operated practically continuously during the period. In addition, one small steam drag line was utilized on this work. On June 30, 1918, drainage construction was 12 per cent completed.

Surveys.—Surveys during the fiscal year included the location of the Rincon siphon and the main canal, those required for the Montoya main canal and laterals, extensions of lateral systems in the El Paso Valley, and investigations accompanied by surveys for the Tornilla and Fort Hancock districts in the lower end of the project. Extensive drainage surveys have been made covering the Rincon Valley, in addition to those required for the Mesilla and El Paso Valleys. The San Elizario Island drain was located during this year and profile of the river from Elephant Butte to Fabens, Tex., including traverse of the river in the El Paso Valley, was completed.

SEEPAGE AND DRAINAGE.

Investigations of ground-water conditions in the Rincon, Mesilla, and El Paso Valleys were continued and extended during the year. Well readings, which are taken at regular intervals, are utilized for location of the large mileage of contemplated drainage canals. The record from these wells, which show a seasonal rise each year and a constant rise from year to year, exhibited a serious seepage condition at the beginning of the fiscal year. At that time approximately 66 per cent of the area in the Mesilla Valley was affected, the underground water elevation being within less than 4 feet of the surface. The same condition in the El Paso Valley covered an area of 69 per cent of the total acreage. Approximately 4½ per cent of the acreage in both valleys had free water on the surface. Since this serious condition could not be quickly relieved by the construction of drains, efforts were made through the associations of the farmers and water users to reduce the amount of water used for irrigating purposes as far as possible. The engineering board, held in January, considered the additional data collected and the plans presented for drainage work on the project.

Construction.—Early in the fiscal year four Bucyrus drag lines were received on the project, and together with the steam machine previously operating, excavated approximately 33 miles of open drains. Mechanical difficulties in the new machines prevented obtaining the expected output. These features were being corrected during the year and individual machines made record runs of cost and output. Contracts were awarded to the Bucyrus Co. for four additional machines, which are expected for delivery during the summer of 1918. With these machines and others that may be available for transfer, together with the award for the construction of portions of the system by contract, considerable relief from the seepage conditions can be expected in certain areas and the construction of the drainage system pushed with all possible expedition.

Irrigation districts.—The formation of the two irrigation districts necessary in the New Mexico and Texas portions of the project was completed during the year. In the El Paso portion a contract for drainage and lateral work was executed between the Secretary and the district during the winter, and the funds previously advanced by the directors of this district to finance temporary drainage operations pending the approval of the contract were later returned. In the New Mexico portion of the project some delay was experienced in the formation of the district and the execution of the contract between the Secretary and the district for drainage and lateral work. The passage of a congressional relief measure permitting the expenditure of $15,000 on the drainage system, pending the execution of the contract, relieved the district from financing the drainage operations to that extent. Before the end of the year a contract was approved, and the small amount of funds advanced by the association were returned. The contract with both irrigation districts contemplated lateral as well as drainage construction and it is expected also that in both districts the irrigation district formation will succeed the water-users' association.

BOARD MEETINGS.

Date.	Subject.	Personnel.
1918.		
Jan. —	Drainage	D. C. Henny, L. M. Lawson, J. L. Burkholder.
Jan. 29	Water distribution, El Paso Valley	D. C. Henny, L. M. Lawson.
June 12	Inspection of Elephant Butte outlet works	O. H. Ensign, R. F. Walter, James M. Gaylord, L. M. Lawson.

OPERATION AND MAINTENANCE.

The Reclamation Service delivered water in 1917 on a rental basis for the irrigation of 64,308 acres of land. The larger acreage of this amount was in New Mexico, and water was supplied under contract with the Elephant Butte Water Users' Association at the rate of actual cost of operation and maintenance plus 10 per cent. In addition, a charge of 50 cents per acre was made for reservoir service. In the El Paso Valley in Texas water was supplied under contracts with various community ditches and individuals during the latter part of the calendar year 1917. During the winter season practically all the large community ditches were taken over by the Reclamation

Service for reconstruction and operation. Beginning with the first irrigation in 1918 an individual water-rental contract was inaugurated with charges for water at the rate of 75 cents per acre-foot for the first 3 acre-feet and $1 per acre-foot for any water used in excess of 3 acre-feet per acre. In addition, a charge of 50 cents per acre was made for reservoir service.

The total amount of water diverted throughout the project amounted to 646,075 acre-feet, giving a duty of approximately 7.9 acre-feet per acre. The taking over of community ditches in the El Paso Valley is expected to reduce the water use and eliminate much waste in irrigation. Individual measurements were carried on as far as possible in order that bills rendered would represent the actual amount of water used and to be paid for. In the New Mexico portion of the project the contract provides for billing the association for the total cost plus 10 per cent, and individual measurement is not possible nor attempted on account of the lack of jurisdiction or authority over communities.

On June 30, 1918, the service was prepared to supply water to 90,000 acres.

Historical review, Rio Grande project.

Item.	1912	1913	1914	1915	1916	1917	1918[1]
Acreage for which Service was prepared to supply water	25,000	35,000	40,000	45,000	85,000	88,000	90,000
Acreage irrigated	23,115	27,723	28,442	33,876	62,513	64,308	68,334
Miles canal operated	6	37	37	37	75¼	86	172
Water diverted (acre-feet)[2]	125,000	149,610	179,964	199,952	420,646	646,075	400,000
Water delivered to land per acre irrigated (acre-feet)[2]	5.40	4.34	5.68	5.90	6.73	7.9	5.5

[1] Estimated.

[2] Measured at point of delivery from canals.

SETTLEMENT.

As in previous years, the project lands were seriously affected by the rise of ground water, due to the overirrigation of cultivated lands and the lack of proper drainage works. Although a large number of land sales and transfers were effected on the project, little attempt was made to interest outside settlers because of the condition of the lands.

The construction results are more in the nature of perfecting the water system for the present area than the addition of new tracts. In the Tornilla district, below Fabens, which area is below the limits of the present project, there is considerable activity in clearing lands and cultivating crops. During the latter portion of the fiscal year 1918 results were apparent from the drains as constructed, and this demonstration of the possibilities to relieve the seepage situation gave some impetus to settlement, which will increase as the drainage and lateral work progresses.

Settlement data, Rio Grande project.

Item.	1913	1914	1915	1916	1917	1918
Total number of farms	1,784	1,536	1,700	1,638	1,700	1,740
Population	6,947	6,642	10,000	10,431	10,500	10,600
Number of irrigated farms	1,784	1,536	1,700	1,638	1,700	1,740
Operated by owners	1,089	932	1,000	1,145	1,170	1,200
Operated by tenants	695	604	700	493	530	540
Number of towns	25	25	25	25	25	25
Population	74,918	78,135	80,000	86,331	86,600	86,950
Total population in towns and on farms	81,865	84,777	90,000	96,762	97,100	97,550
Number of public schools	47	47	52	52	52	52
Number of churches	76	81	85	87	90	99
Number of banks	14	14	19	19	19	27
Total amount of capital stock	$2,580,000	$2,645,000	$3,251,000	$3,251,000	$3,251,000	$4,000,000
Amount of deposits	$10,398,000	$11,653,000	$19,916,380	$29,282,455	$31,000,000	$35,000,000
Number of depositors	40,000	45,784	48,090	50,000	55,000	60,000

PRINCIPAL CROPS.

Alfalfa was still the principal crop on the project, but the acreage was reduced materially in 1917 over the previous year on account of the effect of the high underground water table. The average yield was also less than the previous year, but the increased price per ton resulted in a total value for the yield in excess of the previous year. To meet the demands for war crops the wheat acreage was doubled during the year, and the returns from this crop were considerably in excess of the previous year. Garden truck, potatoes, and vegetables did well during the season, and a particularly abundant and well-paying crop is expected in 1918.

Crop report, Rio Grande project, New Mexico-Texas, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	26,112	Ton	64,569	2.47	$27.00	$1,743,363	$66.75
Alfalfa seed	33	Bushel	139	4.2	12.00	1,668	50.50
Apples	378	Pound	262,960	695	.04	10,518	27.75
Barley	3,610	Bushel	91,679	25.3	1.40	128,350	35.50
Beans	4,011	do	46,058	8.9	4.80	173,078	43.15
Beets, sugar	1,078	Ton	8,420	7.7	5.00	42,100	39.00
Corn, Indian	10,566	Bushel	265,836	25	1.40	372,170	35.20
Corn, sorghum	1,894	do	38,566	20	1.20	46,267	24.40
Corn fodder	2,113	Ton	6,188	2.9	16.00	99,008	46.85
Corn, broom	5	Pound	2,000	400	.07½	150	30.00
Cantaloupes	548	Crate	103,220	188	1.20	123,864	226.00
Fruits, small	115	Pound	193,528	1,681	.03	5,806	50.50
Garden	2,160					162,000	75.00
Hay, except above	440	Ton	677	1.5	20.00	13,540	30.75
Oats	1,145	Bushel	40,294	35	.80	32,235	28.15
Onions	11	do	43	3.9	1.42	61	5.50
Pasture	2,158					64,740	30.00
Peaches	228	Pound	400	1.7	.04	16	.07
Pears	814	do	837,612	1,029	.03	25,128	30.85
Peas	114	Bushel	1,240	10.8	4.20	5,208	45.70
Potatoes, white	7	do	630	90	1.20	787	112.50
Potatoes, sweet	338	do	21,290	63	.60	12,774	37.80
Rye	65	do	1,210	18.6	1.96	2,372	36.50
Tomatoes	148	Pound	638,620	4,315	.01	6,386	43.15
Watermelons	84	Ton	193	2.3	15.00	2,895	34.45
Wheat	11,714	Bushel	261,970	22.3	2.00	523,940	44.70
	69,889						
Less duplicated areas	6,263						
Total cropped	63,626	Total and average				3,598,424	56.50
Irrigated, no crop:							
Nonbearing orchard	1,188						
Crops grown in nonbearing orchard	545						
Young alfalfa	39						
Less duplicated area	1,090						
Total irrigated	64,308						

FINANCIAL STATEMENT.

Project balance sheet, Rio Grande project, June 30, 1918.

Cash		$292.75
Inventory of stock on hand		195,215.89
Accounts receivable		45,657.36
Construction work contracted		221,691.16
Construction cost	$8,110,942.01	
Less construction revenue earnings	441,576.39	
Add cost adjustments	[1]30,025.45	
	411,550.94	7,699,391.07
Total		8,162,248.23
Accounts payable		130,242.62
Contingent obligations		275.00
		221,691.16
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	$8,704,469.97	
Collection, transfer, refund, and joint construction vouchers issued	894,430.52	
Net investment		7,810,039.45
Total		8,162,248.23

Feature costs of Rio Grande project, New Mexico–Texas, to June 30, 1918.

Features.	Cost.	
	Fiscal year, 1918.	Total to June 30, 1918.
Examination and surveys:		
Project, general		$76,619.16
High line canal		37,513.76
Silt deposits, Elephant Butte Reservoir	$1,216.68	9,236.12
Hydrographic survey, New Mexico		5,534.43
Hydrographic survey, Colorado		15,409.70
Drainage investigation, San Luis Valley		7,286.53
San Marcial investigations, New Mexico		1,792.34
Topographic surveys, Torrillo and Fort Hancock districts	2,906.69	2,906.69
Rio Grande hydrometry	1,297.31	1,297.31
	5,420.68	157,596.04
Storage system:		
Preliminary and general		398,350.48
Elephant Butte Dam	[1]88,578.73	4,171,966.75
Embankment		129,946.04
Spillway		124,461.35
	[1]88,578.73	4,824,724.62
Canal system:		
Palomas system, preliminary	117.25	1,774.73
Rincon system:		
Preliminary surveys and testing (including Arrey Canal surveys)	[1]1,916.50	19,440.22
Percha Dam	21,646.05	137,849.13
Tonuco cut-off	188.98	188.98
Arrey Canal, excavation and structures	7,373.85	105,165.17
Garfield Canal, excavation and structures	195,478.74	217,680.01
Hatch Canal and siphon (near Salem, N. Mex.) excavation and structures	151,736.67	151,736.67
Rincon Canal, surveys, and culvert	2,955.49	2,955.49
Leasburg system:		
Preliminary		29,438.57
Leasburg diversion dam	1,512.91	94,182.45
Leasburg Canal	5.75	86,501.14
Las Cruces, Mesilla wasteway	14,602.51	14,602.51
Leasburg extension canal	6.17	40,836.80
Picacho branch canal		16,067.55
Mesilla system:		
Mesilla diversion dam	194.66	126,309.31
Mesilla West Side Canal	1,443.56	264,738.02
Widening west side canal	7,430.06	7,430.06
Mesilla east side canal	706.10	122,694.49
San Miguel branch of west side canal	22,456.04	22,456.04
Timber flumes over Las Cruces Mesilla wasteway	1,032.58	1,032.58

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[1] Deduct.

Feature costs of Rio Grande project, New Mexico–Texas, to June 30, 1918—Continued.

Features.	Cost.	
	Fiscal year, 1918.	Total to June 30, 1918.
Canal system—Continued		
El Paso Valley system:		
Preliminary		$145,228.09
Franklin Canal	$114.88	314,157.90
San Elizario feeder canal	131.03	24,096.64
San Elizario canal and minor structures	23,152.63	31,330.72
Franklin canal wasteway	579.94	579.94
San Elizario headgate No. 1	280.14	1,743.20
San Elizario headgate No. 2	12,288.37	12,288.37
Guadalupe headgate	255.74	1,843.13
	463,773.60	1,994,347.91
Lateral system:		
Leasburg system and preliminary		3,959.77
Rincon system:		
Hatch canal lateral construction	2,324.66	2,324.66
Rincon Valley lateral construction	609.83	609.83
Mesilla system:		
Mesilla west side canal, lateral surveys and investigation	672.16	4,727.82
Misella east side canal, lateral surveys and investigations	67.84	4,635.87
Montoya district:		
Montoya lateral and its branches	30,193.81	30,193.81
Montoya headgate	4,576.12	4,576.12
El Paso Valley, preliminary surveys and testing	18,941.90	24,678.72
Bovee lateral		1,463.86
Surveys, lateral district No. 2	90,210.27	91,480.07
Surveys, lateral district No. 4	3,554.47	3,554.47
Surveys, lateral district No. 5	4,267.82	4,267.82
Surveys, lateral district No. 6	189.45	189.45
Surveys, lateral district No. 8	991.49	991.49
Surveys, lateral district No. 9	1,005.42	1,005.42
Surveys, lateral district No. 10	24.57	24.57
Juan de Herrera siphon	163.25	7,567.24
	157,566.56	186,250.99
Drainage system:		
Project as a whole, preliminary		164.51
Palomas system, preliminary		20.41
Rincon system, preliminary	2,515.60	3,102.74
Hatch drain, location surveys	329.45	329.45
Mesilla system:		
Preliminary surveys and testing	10,097.91	25,524.36
East drain extension	9.72	9.72
East drain, excavation and structures	43,303.75	90,803.99
Nemexas drain, excavation and structures	40,416.31	40,416.31
West drain, excavation and minor structures	40,665.72	40,665.72
Tributary drains	305.67	305.67
Leasburg drain, preliminary	96.41	96.41
Anthony drain, preliminary	1,445.32	1,445.32
La Mesa drain	47.61	47.61
Chamberino drain, preliminary	28.89	28.89
Vinton drain, preliminary	26.39	26.39
Park drain, preliminary	27.62	27.62
Montoya district surveys in Texas	150.72	1,301.80
El Paso system:		
Preliminary surveys and testing	9,941.16	24,725.65
Mesa drain, excavation and structures	62,763.43	98,834.92
Middle drain, excavation and structures	40,420.67	40,420.67
River drain excavation and structures	17,763.48	17,763.48
Fabens drain, preliminary	57.79	57.79
	270,413.62	386,119.43
Flood protection:		
Project as a whole, preliminary	1,341.55	3,749.84
Palomas Valley system		33.43
Leasburg system, cut-off in river channel		13,877.59
Mesilla Valley system—		
Levee at east side canal headworks		2,620.03
Levee at west side canal headworks		2,841.17
El Paso Valley system—		
Preliminary		23.12
San Elizario levee No. 1	1,750.14	1,750.14
	3,091.69	24,895.32

Feature costs of Rio Grande project, New Mexico–Texas, to June 30, 1918—Continued.

Features.	Cost.	
	Fiscal year, 1918.	Total to June 30, 1918.
Power system: Transmission lines	....	1,294.14
Farm units:		
Subdivision surveys, project as a whole	303.43	2,250.23
Palomas system	....	3,352.33
Rincon system	....	20,855.02
Leasburg system	....	14,530.50
Mesilla system	....	52,405.21
El Paso system	....	27,962.01
	303.43	121,355.30
Permanent improvements:		
Leasburg system—		
Buildings	....	3,063.02
Roads—		
Leasburg canal	....	10,375.60
Leasburg canal extension	....	133.29
Picacho canal	....	186.44
Mesilla system—		
Buildings	....	1,358.90
Roads—		
West side canal	....	1,422.28
East side canal	....	89.14
El Paso system—		
Buildings	....	1,381.26
Elephant Butte Dam, roads	....	26,612.37
Rincon system, buildings	1,597.68	3,026.55
	1,597.68	47,638.85
Telephone system:		
Leasburg system	....	1,400.52
Mesilla system	....	8,761.24
Rincon system	7.57	7.57
	7.57	10,169.33
Subtotal	....	7,754,391.93
Operation and maintenance during construction (water-rental basis)	117,904.34	337,624.63
Balance in plant accounts:		
El Paso	38,329.78	126,210.38
Elephant Butte	[1] 23,992.18	[1] 112,819.86
	14,337.60	13,390.52
Clearing accounts (unadjusted)	[1] 1,916.62	5,534.93
Loss on buildings and cottages	....	39,894.16
Gross construction cost of project to June 30, 1918	943,921.42	8,150,836.17
Less revenues earned during construction period:		
Rental of buildings	998.90	12,606.96
Rental of grazing and farming lands	8.00	8.00
Net power earnings (prior to public notice)	....	2,243.33
Rentals of irrigation water	140,309.23	420,703.63
Rentals of telephones and tolls	124.82	5,326.87
Other revenues, unclassified	67.41	687.60
Profit on hospital operations	3,507.43	4,928.59
Suspended contract cost, Knowles & Warren contract, No 777	4,940.12	4,940.12
	149,955.91	451,445.10
Net cost to June 30, 1918	....	7,699,391.07

[1] Deduct.

Statement of cost by calendar years, Rio Grande project.

Year ending Dec. 31—	Construction.	Operation and maintenance during construction.	Total.
1906	$24,589.24	....	$24,589.24
1907	141,484.18	$2,398.86	143,883.04
1908	153,567.87	2,400.51	155,968.38
1909	105,421.86	1,890.88	107,312.74
1910	334,599.30	4,435.18	339,034.48
1911	585,991.02	5,303.18	591,294.20
1912	859,515.72	5,587.05	865,102.77
1913	942,232.25	23,864.19	966,096.44
1914	2,099,399.24	30,736.25	2,130,135.49
1915	901,476.03	47,770.61	949,246.64
1916	520,271.53	58,346.46	578,617.99
1917	476,912.70	78,764.78	555,677.48
To June 30, 1918	608,930.99	76,126.68	685,057.67
Plant accounts to June 30, 1918	13,390.52	....	13,390.52
Clearing accounts to June 30, 1918	5,534.93	....	5,534.93
Loss on buildings and cottages	39,894.16	....	39,894.16
Total	7,813,211.54	337,624.63	8,150,836.17

Statement of cost by fiscal years, Rio Grande project.

Year ending June 30—	Construction.	Operation and maintenance during construction.	Total.
1907	$89,757.29	....	$89,757.29
1908	174,949.01	$2,138.18	177,087.19
1909	113,335.41	1,167.54	114,502.95
1910	259,654.15	6,856.40	266,510.55
1911	303,292.41	5,680.44	308,972.85
1912	777,317.32	5,678.88	782,996.20
1913	947,304.36	7,447.45	954,751.81
1914	1,451,013.42	33,490.27	1,484,503.69
1915	1,500,688.47	47,277.71	1,547,966.18
1916	940,642.06	41,396.66	982,038.72
1917	382,841.93	68,586.76	451,428.69
1918	813,596.10	117,904.34	931,500.44
Plant accounts to June 30, 1918	13,390.52	....	13,390.52
Clearing accounts to June 30, 1918	5,534.93	....	5,534.93
Loss on buildings and cottages	39,894.16	....	39,894.16
Total	7,813,211.54	337,624.63	8,150,836.17

Estimated cost of contemplated work, Rio Grande project, during fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys:		
Elephant Butte silt survey	$500	
Hydrography, project as a whole	1,000	
Drainage investigations	400	
Miscellaneous	100	$2,000
Storage: Elephant Butte sluice gates and balanced valves		1,000
Canal system:		
Garfield Canal excavations	4,000	
Hatch siphon across Rio Grande	15,000	
Hatch Canal, excavation and structures	20,000	
Rincon Canal, excavation and structures	90,000	
Rincon siphon, across Rio Grande	54,000	
Leasburg Dam, raising crest	10,000	
Mexican Dam, sluiceway	10,000	
San Elizario Canal, excavation and structures	29,000	
Island Feeder Canal, excavation and structures	25,000	257,000
Lateral system:		
Rincon Valley	10,000	
Mesilla Valley	50,000	
El Paso Valley—		
Ysla district	48,000	
Salatral district	39,000	
Lower Franklin district	36,000	
Clint	25,000	208,000
Drainage system:		
Mesilla Valley	435,000	
El Paso Valley	290,000	725,000
Permanent improvements:		
Hatch district, Rincon Valley	1,500	
Montoya district, El Paso Valley	1,500	3,000
Operation and maintenance during construction (water-rental basis)		150,000
Total		1,346,000

NORTH DAKOTA, NORTH DAKOTA PUMPING PROJECT.

W. S. ARTHUR, project manager, Williston, N. Dak.

LOCATION.

County: Williams.

Townships: 152 to 155 N., Rs. 100 to 104 W., fifth principal meridian.

Railroad: Great Northern.

Railroad stations and estimated population June 30, 1918: Buford, 75; Trenton, 150; and Marley (less than 25), on Buford-Trenton unit are small unincorporated villages. Williston, on the Williston unit, is an incorporated city of about 5,300 population.

WATER SUPPLY.

Source of water supply: Missouri River.

Area of drainage basin: 155,000 square miles.

Mean run-off of Missouri River, near Williston, May to October, 1905 to 1907: 15,000,000 acre-feet.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season 1918: Buford-Trenton unit, 4,049 acres; Williston unit, 8,189 acres.

No part of the project was irrigated in 1917. The Williston unit is being operated for commercial power, under a contract with the city of Williston.

Length of the irrigation season: 80 days, beginning from June 1 to June 15.

Average elevation of the irrigable area: 1,900 feet above sea level.

Rainfall: The actual precipitation, calendar year 1917, was 7.59 inches. The average for 14 years, beginning in 1904, is 13.32 inches.

Range of temperature on the irrigable area: −49° to 107° F.

Character of soil on irrigable area: Ranges from sandy loam to heavy clay gumbo.

Principal products: Alfalfa, grains, vegetables. The production of corn for silage is increasing as well as the output of hogs, and dairying has become well established.

Principal markets: St. Paul, Minneapolis, Duluth, Chicago. The local market is now important since it consumes all of the butter product and all of the output from the dairies.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: Buford-Trenton unit, April 8, 1908; March 9, May 13, 1911; June 25, 1912; July 15, 1913; February 26, March 7, 1914. Williston unit, April 27, November 30, 1908; April 30, 1909; March 9, April 14, 1911; June 25, 1912; March 11, June 23, July 15, July 21, 1913; February 26, March 7, 1914.

Location of lands opened: Buford-Trenton unit, Tps. 152 and 153 N., Rs. 103 and 104 W., fifth principal meridian; Williston unit, Tps. 154 and 155, N., Rs. 100 and 101 W., fifth principal meridian.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: Two acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $38 under public notice of 1908.

Annual operation and maintenance charge: 70 cents per acre of irrigable land and 50 cents per acre-foot of water actually used, under public notices of 1908; $1.50 per acre of irrigable land and $1 per acre-foot of water used under order of May 13, 1911. For season of 1914 the project was on a rental basis and the terms were $1 per acre, including 1 acre-foot of water, and $1 per acre-foot for water delivered in excess of 1 acre-foot per acre.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers September 22, 1905.

Construction authorized by Secretary January 23, 1906.

First division: Buford-Trenton unit completed November, 1907.

Power and pumping plants: Williston unit, completed for present use in the fall of 1907; first division completed in the spring of 1908.

Pumping plant and transmission lines: Buford-Trenton unit, completed for present use in the spring of 1908.

First irrigation by Reclamation Service, season of 1908:

Power installation completed for 2,000 horsepower June 30, 1910.

Buford-Trenton unit, 38 per cent completed June 30, 1918; Williston unit, 64 per cent completed June 30, 1918.

Entire project, 64 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the North Dakota pumping project provides for a central steam-power plant located near Williston, operating pumps and generating electricity for the operation of other pumps on the Buford-Trenton and Williston units. On the Buford-Trenton unit water is pumped from a barge into a settling basin 30 feet above the river, and is then lifted by a permanent pumping station into a canal, 50 feet above the settling basin, for the irrigation of bench lands near Buford. A transmission line 28.3 miles in length delivers power for the operation of the pumps. The plan of the Williston unit provides for a series of motor-driven centrifugal pumps on a barge in the Missouri River, a settling basin receiving the water from the barge, and a main canal of 90 second-feet capacity extending along Little Muddy Creek to the power plant, where two sets of steam-driven turbines operate centrifugal pumps to lift water 51 feet into E Canal. From the main canal, about midway between the river and the power plant electrically driven pumps raise 35 second-feet 28 feet into B Canal, and from the B Canal 20 second-feet are raised an additional 28 feet into C Canal. The main power station is located close to a 9-foot vein of lignite coal, from which fuel is obtained.

The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan which have been completed are: The central power station, coal mine and transmission lines; at Buford-Trenton unit, two pumping stations, settling basin, and canal system; at Williston unit, four pumping stations, two settling basins, and canal system. No construction work is in progress at present.

Features remaining for future construction are: The enlargement of the power house and installation of additional machinery; at Buford-Trenton unit, extension of Highline Canal and construction of Lowline Canal and laterals for irrigation of bottom lands; at Williston unit, construction of east and west bottom canal systems, with additional intake and pumping stations.

SUMMARY OF GENERAL DATA FOR NORTH DAKOTA PUMPING PROJECT TO END OF FISCAL YEAR, 1918.

Areas:			
Irrigible acreage when project is complete			26,273
Public land entered to end of fiscal year		303	
Public land open to entry at end of fiscal year		532	
Public land withdrawn at end of fiscal year		78	
State land		1,073	
Private land		24,287	
Acreage service could have supplied season of 1917			12,239
Decrease fiscal year 1918			44
Estimated acreage service can supply July 1, 1919			12,195
Finances:			
Net construction cost to end of fiscal year			$730,761.92
Per cent complete at end of fiscal year			64
Appropriated for fiscal year 1919, total			$64,000.00
Estimated per cent complete June 30, 1920			64
Estimated total construction cost to June 30, 1920			$736,800.91
Estimated per cent complete June 30, 1920			64
Announced construction charges per acre			$38 00
Appropriation, fiscal year 1918			$54,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$33,857.19		
Transfers	2,225.50		
		36,082.69	
Registered liabilities chargeable to 1918 appropriation		3,883.61	
			39,966.30
Unencumbered balance July 1, 1918			14,033.70

Repayments:	
Value of construction water-right contracts	$276, 625. 49
Construction charges—	
Accrued to end of fiscal year	48, 202. 29
Collected to end of fiscal year	8, 863. 18
Uncollected at end of fiscal year	39, 339. 11
Operation and maintenance charges (public notice)—	
Accrued to end of fiscal year	24, 278. 91
Collected to end of fiscal year	12, 964. 28
Uncollected at end of fiscal year	11, 314. 63
Water rental charges—	
Accrued to end of fiscal year	2, 948. 58
Collected to end of fiscal year	2, 149. 03
Uncollected at end of fiscal year	799. 55
Power earnings—	
Accrued to end of fiscal year	[1] 138, 138. 10
Collected to end of fiscal year	[1] 133, 303. 10
Uncollected at end of fiscal year	4, 835. 00
Drainage:	
Miles of drains built to end of fiscal year, open	12. 7
Cost of drainage works to end of fiscal year	$3, 546. 95

ECONOMIES OF GOVERNMENT WORK.

Coal mine.—At the close of the fiscal year 1917 it was apparent that the future development of the mine would require a departure from the original north entry, because of water, falls in the early stages of the work, and length of haulage. During the fiscal year 1918 a new entry was begun and completed at a large saving in haulage and improvement in the physical condition of the mine. The cost of this entry, approximately $3,000, was charged against coal production for the year and the tonnage cost for the year is correspondingly high.

During the year 9,544 tons of coal were mined at a cost of $14,083 or $1.48 per ton. Notwithstanding this abnormal expense the unit cost for the life of the mine was reduced. The small output required for commercial power operations—about 30 tons per working day—precludes a low unit cost, but it was kept below the prevailing costs in the community.

COMMERCIAL POWER.

The contract with the city of Williston, dated October 16, 1912, covering the delivery of surplus electrical energy from the power plants, remained in force, and the plant was in operation the entire year to furnish energy in compliance with this contract.

During the year 1,027,000 kilowatt-hours of electrical energy were delivered to the city switchboard. This was an increase of 83,950 kilowatt-hours over the previous fiscal year. The second half of the year saw a falling off in demand, owing first to the lightless night order of the Fuel Administration and second to the daylight saving order promulgated by Congress. Only one interruption of considerable length occurred, due to the burning of a transmisson line pole in the railroad yards. By previous arrangement, the damage was repaired during the period of lightest demand and the length of interruption was 80 minutes. The following is a statement of the results of the operations for the fiscal year:

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[1] Includes $70.15 from sale of power and light to employees.

Sale of commercial power, North Dakota pumping project.

Month.	Cost.		Collections.		Profit.	
	This month.	Total to date.	This month.	Total to date.	This month.	Total to date.
1917.						
July	$1.081.95	$101,488.71	$2,616.00	$108,497.95	$1,534.00	$7,009.24
August	2,877.56	104,366.27	2,606.00	111,103.95	[1] 271.56	6,737.58
September	3,137.75	107,504.02	2,637.00	113,740.95	[1] 500.75	6,236.93
October	3,441.73	110,945.75	2,801.40	116,542.35	[1] 640.33	5,596.60
November	3,123.94	114,109.69	2,931.60	119,473.95	[1] 192.34	5,404.26
December	2,659.61	116,729.30	3,057.00	122,530.95	397.39	5,801.65
1918.						
January	3,004.00	119,733.30	2,958.00	125,488.95	[1] 46.00	5,755.65
February	[2] 3,258.98	116,474.32	2,628.00	128,116.95	[2] 5,886.98	11,642.63
March	2,571.55	119,045.87	2,673.00	130,789.95	101.45	11,744.08
April	2,806.68	121,852.55	2,442.00	133,232.95	[1] 363.68	11,380.40
May	2,309.59	124,162.14	2,432.00	135,664.95	122.41	11,502.81
June	2,391.23	126,553.87	2,403.00	138,067.95	11.77	11,514.58
Sales to employees	....	....	....	70.15	....	11,584.73

[1] Decrease.

[2] Adjustment.

OPERATION AND MAINTENANCE.

During the fiscal year 1918 the power plant, coal mine, and transmission line to Williston were operated. The water users and land owners organized an irrigation district under the new North Dakota irrigation district law, but were unable to complete their work early enough to secure best results under irrigation in 1918. They therefore signed a tentative contract and requested that irrigation operations commence in 1919.

As the fiscal year closes, the project is again suffering severe drought, with prospect of a total crop failure, and there is a feeling now that nothing must remain undone to insure irrigation indefinitely.

Historical review, North Dakota pumping project.

WILLISTON UNIT.

Item.	1913	1914	1915	1916	1917	1918
Area for which service was prepared to supply water	8,189	8,189	8,189	8,189	8,189	8,189
Acreage irrigated	1,739	1,056	....	....	....	....
Number of farms irrigated	54	44	....	....	....	....
Miles of canal operated	32	30	....	....	....	....
Water diverted (acre-feet)	3,638	2,671	....	....	....	....
Water delivered to land (acre-feet)	2,288	1,792	....	....	....	....
Water per acre of land irrigated (acre-feet)	1.31	1.70	....	....	....	....

BUFORD-TRENTON UNIT.

Area for which service was prepared to supply water	4,049	4,049	4,049	4,049	4,049	4,049

SETTLEMENT.

Settlement is practically stationary because of the suspension of irrigation operations. Project farmers suffered much from shortage of feed and were compelled to sacrifice their dairy herds. In face of the present drought, which indicates the third successive failure, the outlook is decidedly gloomy.

Three farmers' clubs continue to be active. The cooperative creamery and ice-cream factory had a successful year in spite of the decrease of local dairy herds. The local elevators and flour mill closed in the spring of 1918 to await the harvest. A potato-storage warehouse built in the fall of 1917 had no potatoes to store or sell, due to the drought.

Settlement data, North Dakota pumping project.

WILLISTON UNIT.

Item.	1914	1915	1916	1917	1918
Total number of farms on project	93	101	101	105	105
Population	146	163	175	190	195
Total number of irrigated farms	26	44			
Operated by owners or managers	18	34	34	34	33
Operated by tenants	8	10	10	10	11
Population	72	140	152	155	160
Number of towns	2	2	2	2	2
Population	4,700	5,000	5,000	5,300	5,360
Population in towns and on farms	4,846	5,163	5,175	5,490	5,555
Number of public schools	4	5	5	6	6
Number of churches	5	6	6	6	6
Number of banks	3	3	3	4	4
Total capital stock		$135,000	$185,000	$235,000	$260,000
Amount of deposits		$1,300,000	$1,500,000	$1,800,000	$2,000,000
Number of depositors		3,000	3,300	3,500	3,800

BUFORD-TRENTON UNIT.

Item.	1914	1915	1916	1917	1918
Total number of farms on project	38	42	42	42	42
Population	69	70	70	70	70
Number of irrigated farms					
Operated by owners or managers	10	19	19	19	19
Operated by tenants	23	23	23	23	23
Number of towns	2	2	2	2	2
Population	350	350	400	400	425
Total population on farms and in towns	419	420	470	470	495
Number of churches	2	2	2	2	2
Number of banks	1	2	2	2	2
Total capital stock	$10,000	$20,000	$20,000	$20,000	$20,000
Amount of deposits	$100,000	$115,000	$115,000	$120,000	$110,000
Number of depositors	200	240	240	250	260

PRINCIPAL CROPS.

Since alfalfa has so nearly disappeared from the project, grain is again the principal crop. Next in importance are potatoes. Dairying and cattle and hog raising combined make the most important of the activities.

FINANCIAL STATEMENT.

Project balance sheet, North Dakota pumping, June 30, 1918.

Inventory of stock on hand		$8,140.39
Accounts receivable		285,451.58
Construction cost	$736,800.91	
Less construction revenue earnings	6,038.99	
		730,761.92
Operation and maintenance cost	247,250.48	
Less operation and maintenance earnings	7,146.58	
		240,103.90
Total		1,264,457.79
Accounts payable		3,884.95
Reserves for repayment to reclamation fund of cost of project		277,991.02
Miscellaneous accruals		36,584.10
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	$1,302,707.92	
Collection, transfer, refund, and joint construction vouchers issued	356,710.20	
Net investment		945,997.72
Total		1,264,457.79

Feature costs of North Dakota pumping project to June 30, 1918.

Principal feature.	Total to June 30, 1918.
Examination and survey	$44,969.88
Lateral system:	
Williston unit	141,292.90
Buford-Trenton unit	58,406.83
	199,699.73
Power system:	
Williston unit—	
Coal mine	14,224.61
Williston barge	39,647.14
Williston transmission line	16,439.30
Pumping substation No. 4	8,281.60
Pumping substation No. 2	14,065.76
Williston power house	176,803.30
Transformer station at barge	2,742.19
Floating boom at barge	772.64
Scow pontoon	1,411.33
Buford-Trenton unit—	
Buford-Trenton transmission line	25,345.99
Buford-Trenton barge	36,583.58
Pumping substation A	36,127.77
Boom and scow pontoon	787.60
Extension to Williston power house	76,329.36
	449,562.12
Permanent improvements and lands:	
Williston unit	17,606.46
Buford-Trenton unit	5,850.13
	23,456.59
Operation and maintenance charges transferred to and compounded with construction charges.	22,191.93
Unadjusted clearing accounts:	
Buford-Trenton unit construction materials and equipment sold—	
Buford-Trenton barge	[1] 2,542.70
Buford-Trenton pumping substation A	[1] 948.54
Miscellaneous salvage	[1] 28.81
Transmission line	440.71
	[1] 3,079.34
Gross construction cost to June 30, 1918	736,800.91
Less revenues earned during construction period:	
Rentals of buildings	347.16
Rentals of irrigating water	196.75
Contractors' freight refunds	5,495.08
	6,038.99
Net cost of construction of project to June 30, 1918	730,761.92

[1] Deduct.

Statement of cost by calendar years, North Dakota pumping project.

Year ending Dec. 31—	Construction.	Operation and maintenance under public notice.	Total cost.
1907	$428,985.77		$428,985.77
1908	202,774.81	$34,444.47	237,219.28
1909	69,221.31	45,106.43	114,327.74
1910	12,432.17	41,915.42	54,347.59
1911	5,392.45	35,206.63	40,599.08
1912	[1] 988.70	49,650.74	48,662.04
1913	[1] 4,666.33	47,049.05	42,382.72
1914		51,114.82	51,114.82
1915	26,728.77	4,473.35	31,202.12
1916		26,014.45	26,014.45
1917		[2] 85,799.78	[2] 85,799.78
Jan. 1 to June 30, 1918	[1] 3,079.34	[3] 5,834.82	[1] 8,914.16
Plant accounts to June 30, 1918		3,909,72	3,909.72
Total	736,800.91	247,250.48	984,051.39

[1] Decrease.
[2] Decrease due to transfer of cost of producing commercial power to net power revenues (C. L. 642).
[3] Decrease due to distribution of estimated plant depreciation.

Statement of cost by fiscal years, North Dakota pumping project.

Year ending June 30—	Construction.	Operation and maintenance under public notice.	Total cost.
1907	$182,924.99		$182,924.99
1908	380,539.00		380,539.00
1909	128,193.39	$55,133.54	183,326.93
1910	12,402.55	42,965.45	55,368.00
1911	9,354.13	37,633.27	46,987.40
1912	4,403.75	36,447.97	40,851.72
1913	[1] 4,961.03	58,968.25	54,007.22
1914	294.70	48,617.27	48,911.97
1915	22,191.93	20,179.98	42,371.91
1916	4,536.84	21,611.13	26,147.97
1917		[1] 72,084.56	[1] 72,084.56
1918	[1] 3,079.34	[1] 6,203,59	[1] 9,282.93
Plant accounts on June 30, 1917		3,837.67	3,837.67
Total	736,800.91	247,250.48	984,051.39

[1] Decrease.

Operating expenses and revenues, North Dakota pumping project, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Pumping for irrigation:						
Williston pumping station No. 1		$73.22	$73.22	$240.88	$149.47	$390.35
Williston pumping station No. 2	[1] $244.98		[1] 244.98	2,932.72	780.51	3,713.23
Williston pumping station No. 3	[1] 396.74	51.26	[1] 345.48	21,564.43	4,707.25	26,271.68
Williston pumping station No. 4	[1] 136.17		[1] 136.17	2,213.19	468.54	2,681.73
Buford pumping station No. 1	[1] 737.32	61.18	[1] 676.14	22,912.84	3,488.36	26,401.20
Buford pumping station No. 2	[1] 389.17		[1] 389.17	26,655.32	5,851.96	32,507.28
Williston power house (irrigation)	[1] 5,333 94	885.48	[1] 4,448.46	89,550.96	24,374.27	113,925.23
Williston transmission line	[1] 176.28	30.78	[1] 145.50	633.12	669.83	1,302.95
Buford-Trenton transmission line	[1] 525.09		[1] 525.09	3,047.23	1,892.38	4,939.61
Buildings		696.00	696.00		5,288.17	5,288.17
Williston telephone system	[1] 13.14	8.50	[1] 4.64	583.13	227.56	810.69
Buford-Trenton telephone system				1,087.27	155.13	1,242.40
Total pumping for irrigation	[1] 7,952.83	1,806.42	[1] 6,146.41	171,421.09	48,053.43	219,474.52
Lateral system:						
Williston unit		14.87	14.87	17,369.35	10,728.61	28,097.96
Buford-Trenton unit				7,100.90	1,528.77	8,629.67
Total lateral system		14.87	14.87	24,470.25	12,257.38	36,727.63
Plant accounts		[1] 72.05	[1] 72.05		3,909.72	3,909.72
Commercial power, preparatory				9,330.54		9,330.54
Subtotal	[1] 7,952.83	1,749.24	[1] 6,203.59	205,221.88	64,220.53	269,442.41
Less unpaid operation and maintenance charges added to construction						[1] 22,191.93
Total	[1] 7,952.83	1,749.24	[1] 6,203.59	205,221.88	64,220.53	247,250.48

[1] Deduct.

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contract with water-right applicants	[1] $61.60	$24,278.91
Operation and maintenance charges paid in advance by water-right applicants		101.20
Operation and maintenance charges paid and forfeited by water-right applicants	61.60	217.87
Penalties on operation and maintenance charges accrued on contracts with water-right applicants		45.41
Rental of land and buildings during operating period	509.00	2,913.53
Rental of irrigating water		2,751.83
Other revenues, unclassified, earned during operating period	287.05	1,481.22
Total	796.05	31,789.97
Difference, excess	6,999.64	
Difference, deficit		215,460.51

[1] Deduct.

OREGON, UMATILLA PROJECT.

H. D. NEWELL, project manager, Hermiston, Oreg.

LOCATION.

Counties: Umatilla and Morrow.

Townships: 4 and 5 N., Rs. 24, 25, 26, 27, 28, and 29 E., Willamette meridian.

Railroads: Oregon-Washington Railroad & Navigation Co.; Spokane, Portland & Seattle R. R.

Railroad stations and estimated population June 30, 1918: Hermiston, 650; Umatilla, 200; Irrigon, 75; Boardman, 50; Messner and Hinkle, junction points.

WATER SUPPLY.

Source of water supply: Umatilla River.

Area of drainage basin: 2,160 square miles.

Annual run-off in acre-feet: Umatilla River at Yoakum (1,200 square miles), 1903 to 1917, maximum, 746,000; minimum, 250,000; mean, 525,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which Service is prepared to supply water, season of 1918: 25,888 acres.

Area under water-right applications, season of 1918: 18,580 acres.

Length of irrigation season: From March 20 to October 16—210 days.

Average elevation of irrigable area: 470 feet above sea level.

Rainfall on irrigable area: Average, 8.8 inches; 1917, 8.1 inches.

Range of temperature on irrigable area: $-28°$ to 115° F. (ordinary minimum, 0° F.).

Character of soil, irrigable area: Sandy loam.

Principal products: Alfalfa, fruits, berries, vegetables.

Principal markets: Portland, Oreg., and Spokane, Wash.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: December 27, 1907; August 3 and November 12, 1908; April 3, 1909; January 6, 1910 (two); February 28 and May 16, 1911; March 2 and May 8, 1912; March 3, April 7, June 23, July 15, and July 21, 1913; January 19 and September 24, 1914; February 25, April 5, and December 12, 1915 (two); March 16, April 12 (three), May 12, May 27, September 21, December 18, 1916; January 2, January 5, February 8, February 23, March 23, April 20, April 23, and December 11, 1917; January 2, January 26, January 30, February 6, February 7, February 16, March 8, and April 3, 1918.

Location of lands opened: Ts. 4 and 5 N., Rs. 24, 25, 26, 27, 28, and 29 E., Willamette meridian.

Limit of area of farm units: Public, 40 acres; private, 160 acres.

Duty of water: 2.8 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $60, $70, and $92.

Annual operation and maintenance charge: Varying with quantity of water used.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers October 27, 1905.

Construction authorized by Secretary December 4, 1905.

Diversion dam and feed canal completed August, 1907.

Cold Springs Dam completed June, 1908.

First irrigation by Reclamation Service season of 1908.

Construction of west extension authorized December 22, 1913.

West Extension (Three Mile Falls) Diversion Dam completed November 28, 1914.

West Extension Main Canal completed June, 1916.

Entire project (including west extension) 86 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Umatilla project provides for the diversion of water from the Umatilla River above Echo, Oreg., through a feed canal 24.5 miles long, into a storage reservoir. Water is diverted from the reservoir through an outlet canal, also from the feed canal by means of a by-pass connecting the feed and outlet canals. Water is also diverted from the Umatilla River by the Maxwell Canal, heading near Butter Creek, and delivered into a distribution system from the reservoir, thus watering land in the Umatilla and Columbia River Valleys near Hermiston, Oreg. In addition some 10,000 acres bordering the Columbia River in the vicinity of Umatilla and Irrigon, Oreg., will be watered by a canal diverting from the Umatilla River about halfway between Hermiston and Umatilla.

The United States intends, for and in connection with the project, to use the waste, seepage, spring, and percolating water arising within the same, and asserts a right thereto by virtue of its reservation of all unappropriated waters of the project source of supply and of its appropriation of said waters in accordance with the State law, heretofore made, for the purpose of the project.

The features which have been completed are the diversion works above Echo, feed canal, Cold Springs Dam, by-pass, diversion works for the Maxwell Canal, diversion works for the west extension, main distributary from Cold Springs Reservoir, main distributary for the west extension, and laterals for the irrigable area now opened. Four drain ditches have been built. The main construction work in progress is the building of laterals in the west extension, also supplemental construction for lands east of the Umatilla River in order to deliver water as near as may be to the most commanding point of each 40 acres.

SUMMARY OF GENERAL DATA FOR UMATILLA PROJECT TO END OF FISCAL YEAR, 1918.

Areas:			
Irrigable acreage when project is complete			36,300
Public land entered to end of fiscal year		5,031	
Public land open to entry at end of fiscal year		341	
Public land withdrawn at end of fiscal year		2,398	
Private land		28,530	
Acreage service could have supplied season of 1917			24,247
Addition in fiscal year, 1918			1,641
Estimated acreage service can supply July 1, 1919			25,888
Acreage actually irrigated, season of 1917			7,335
Acreage cropped under irrigation, season of 1917			5,546
Crops:			
Value of irrigated crops, season of 1917			$311,395.00
Value of irrigated crops, per acre cropped			56.15
Finances:			
Net construction cost to end of fiscal year			$2,344,003.54
Per cent complete at end of fiscal year			86
Appropriated for fiscal year 1919, total			[1] $80,000.00
Allotment for construction, fiscal year 1919, including supplemental construction			$70,000.00
Estimated per cent complete, June 30, 1919			87.5
Proposed appropriation, fiscal year 1920, for construction			$50,000.00
Estimated gross construction cost to June 30, 1920			$2,497,000.00
Estimated per cent complete, June 30, 1920			89
Announced construction charges per acre			$60, $70, $92
Appropriation, fiscal year 1918			$157,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$77,456.79		
Transfers	4,914.89		
		$82,371.68	
Registered liabilities chargeable to 1918 appropriation		6,135.28	
			88,506.96
Unencumbered balance, July 1, 1918			68,493.04

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[1] Plus unexpended balance of 1918 appropriation.

Repayments:	
Value of construction, water-right contracts	$1,348,232.56
Construction charges—	
Accrued to end of fiscal year	232,579.50
Collected to end of fiscal year	213,615.83
Uncollected at end of fiscal year	18,963.67
Operation and maintenance charges (public notice)—	
Accrued to end of fiscal year	124,911.49
Collected to end of fiscal year	105,731.04
Uncollected at end of fiscal year	19,180.45
Water rental charges—	
Accrued to end of fiscal year	18,036.50
Collected to end of fiscal year	17,527.88
Uncollected at end of fiscal year	508.62
Drainage:	
Estimated acreage damaged by seepage to end of fiscal year	200
Miles of drains built to end of fiscal year, open	10
Estimated acreage protected by drains built to end of fiscal year	2,000
Estimated acreage to be protected by authorized system	2,000
Cost of drainage works to end of fiscal year	$54,812.63

CONSTRUCTION DURING FISCAL YEAR.

Distribution system, east side.—10,540 linear feet of small laterals were built as supplemental construction for eight small districts. Five districts were completed, three partially completed. The work done consisted in laying 1,440 linear feet of 16-inch and 6,670 linear feet of 20-inch cement pipe; also 1,330 linear feet of second-hand 14-inch wood pipe. In addition 1,100 linear feet of lateral were lined with concrete 2 inches thick, involving the placing of 55 cubic yards or 990 square yards of concrete lining. Fifteen minor structures were built, requiring 24 cubic yards of concrete.

West extension.—About 3.22 miles of laterals were built. The work involved 9,300 cubic yards of excavation, 2,500 cubic yards of back fill, and 1,180 linear feet of 24-inch, 2,240 linear feet of 20-inch, and 3,890 linear feet of 16-inch cement pipe; 400 linear feet of 14-inch second-hand wood pipe were laid and 9,315 linear feet of laterals were lined with concrete 2 inches thick, requiring the placing of 444 cubic yards or 8,000 square yards of concrete lining. Thirty-one minor structures were built, requiring 46 square yards of concrete. One wooden bridge was built over the main canal.

OPERATION AND MAINTENANCE.

Diversion of water to the feed canal for storage purposes was resumed December 1, 1917, and was continued until May 21, 1918. Cold Springs Reservoir reached a maximum of 49,075 acre-feet on March 31, 1918. After March 31 the flow in the feed canal was maintained at a stage which would make good reservoir losses and the draft for direct irrigation. On account of the exceptionally dry season low water occurred in the river about one month earlier than common. Seventy-two thousand one hundred acre-feet were diverted for storage purposes, of which 56,300 acre-feet reached the reservoir. The available storage on June 30, 1918, was 32,875 acre-feet.

Delivery of water to distribution system began March 31. The total discharge from the reservoir to June 30 was 23,050 acre-feet. Delivery of water to the Maxwell Canal began on March 31, the total diversions to June 30 being 13,650 acre-feet. The irrigable area of holdings on that portion of the project east of the Umatilla River is estimated to be 12,000 acres and the area actually irrigated approximately 7,000 acres.

West extension.—Diversions of water for irrigation purposes continued until November 30, 1917. The irrigation season was extended fully one month in order to facilitate the development of raw land. Diversions of water from the river recommenced March 30 and have continued to date, 6,568 acre-feet having been diverted to June 30. About 1,400 acres have been irrigated, of which 500 acres are in the vicinity of Irrigon and Umatilla, the remainder being located near Boardman. Extensive deposits of sand in the main canal have greatly restricted its carrying capacity.

Historical review, Umatilla project.

Item.	1913	1914	1915	1916	1917	1918[1]
Acreage for which service was prepared to supply water	18,300	17,587	16,000	19,000	24,247	25,888
Miles of canal operated	112	112	112	163	165	166.5
Acreage irrigated	5,000	5,100	5,300	5,900	7,335	8,200
Water diverted (acre-feet)	81,500	59,900	86,200	93,000	99,900	86,000
Water delivered to land (acre-feet)	42,250	36,300	29,550	34,380	45,365	46,000
Per acre of land irrigated (acre-feet)	8.45	7.10	5.57	5.83	6.19	5.61

[1] Estimated.

SETTLEMENT.

The population of the project in 1917 was 2,200, about half living on farms, the other half in the four project towns of Hermiston, Umatilla, Irrigon, and Boardman.

On February 7, 1918, public notice issued announcing the opening of the third unit of the west extension, which includes 1,608 acres of irrigable land. Twenty-one tracts of public land were filed upon during the year; 12 tracts are still open to entry.

Settlement data, Umatilla project.

Item.	1916	1917	1918[1]
Total number of farms on project	[2] 745	[2] 800	[2] 843
Population	975	1,024	1,050
Number of irrigated farms	364	411	420
Operated by owners or managers	216	302	320
Operated by tenants	148	109	100
Population	975	1,024	1,060
Number of towns	4	4	4
Population	1,225	1,100	1,150
Population in towns and on farms	2,200	2,124	2,200
Number of schools (public)	6	6	6
Number of churches	9	9	9
Number of banks	1	1	1
Total capital stock	$25,000	$25,000	$26,000
Amount of deposits	$99,000	$157,000	$170,000
Number of depositors	845	960	1,000

[1] Estimated. [2] Number of water-right applications and rental contracts.

PRINCIPAL CROPS.

During 1917 approximately 7,300 acres were irrigated and approximately 5,500 acres cropped, the difference being mainly nonbearing orchards and new seedings of alfalfa. The total value of crops was $311,400, as compared with $139,800 during 1916. The increase in crop values was due largely to the great price inflation which occurred during 1917. The year was averagely favorable for alfalfa, and on the whole favorable for fruit. The total yield of apples doubled over that of the previous year. There was a pronounced increase also in the yield of alfalfa and vetch seed.

The agricultural situation for 1918 is on the whole promising in spite of the complete loss of the fruit crop and an unusual condition of drought.

Crop report, Umatilla project, Oregon, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	4,047	Tons	14,834	3.7	$15.37	$227,940	$56.32
Alfalfa seed	83	Bushels	256	3.1	10.25	2,625	31.63
Apples	342	Pounds	772,717	2,259.4	.0176	13,630	39.86
Barley	4	Bushels	48	12	1.20	60	15.00
Beans	4	..do	21	5.2	7.71	160	40.00
Corn, Indian	130	..do	3,799	29.2	1.946	7,395	56.89
Corn, fodder	110	Tons	571	5.2	8.109	4,630	42.09
Fruits, small	49					4,205	85.82
Garden	50					6,660	133.20
Hay	221	Tons	195	.9	13.164	2,565	11.61
Millet seed	3	Bushels	15	5	6.667	100	33.33
Onions	2	..do	226	112	1.429	325	162.50
Pasture	1,293					15,895	12.29
Peaches	160	Pounds	438,834	2,742.7	.0134	5,895	36.84
Pears	10	..do	22,100	2,210	.0345	760	76.00
Potatoes, white	106	Bushels	10,311	97.3	1.133	11,680	110.19
Wheat	9	..do	150	16.7	2.10	315	35.00
Watermelons	11					650	59.09
Miscellaneous	77					5,905	76.66
Less duplicated areas	1,165						
Total cropped	5,546	Total and average				311,395	56.15

		Areas.	Acres.	Number farms.	Per cent of project.
Irrigated, no crop:		Total irrigable area farms reported.	13,031	411	49.5
Nonbearing orchard	518	Total irrigated area farms reported.	7,335	411	27.8
Young alfalfa	906	Under water-right applications.	5,660	287	21.5
Ground, fall plowed	82	Under rental contracts	587	52	2.2
Miscellaneous	380	Miscellaneous [1]	1,088	80	4.1
Less duplicated areas	97	Total cropped area farms reported.	5,546	411	21.1
Total irrigated	7,335				

[1] 8 farms duplicated.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, DECEMBER 11, 1917.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, and in accordance with the five agreements described in section 2 hereof, providing for additional construction for lands having vested water rights from the system of the Oregon Land & Water Co., and being located in the west extension of the Umatilla project, Oregon, public notice is hereby issued as follows:

2. **Lands for which water will be furnished.**—The necessary construction work having been performed, water will be furnished under

said project in the irrigation season of 1918, and thereafter, for irrigable lands in sections 13 and 22, T. 5 N., R. 27 E., W. M., and section 18, T. 5 N., R. 28 E., W. M., which lands are described in Oregon Land & Water Co. deeds Nos. 3, 15, 121, and 179, and also in the following five agreements with the United States, approved by the Acting Director of the Reclamation Service December 14, 1916, to wit:

(*a*) Eugene Dexter and Mabel Dexter, contractors (O. L. & W. Co. deed No. 3), dated October 3, 1916, and recorded in volume 99 of deeds at page 61, Umatilla County, Oreg.; covers 10.56 acres.

(*b*) M. C. Burchett and Maggie Burchett, contractors (O. L. & W. Co. deed No. 15), dated May 1, 1916, and recorded in volume 99 of deeds at page 137, Umatilla County, Oreg.; covers 16.2 acres.

(*c*) W. A. Ford and Harriett Ford, contractors (O. L. & W. Co. deed No. 15), dated April 22, 1916, and recorded in volume 99 of deeds at page 115, Umatilla County, Oreg.; covers 4.14 acres.

(*d*) R. A. Allen and Margaret Allen, contractors (O. L. & W. Co. deed No. 121), dated June 24, 1916, and recorded in volume 99 of deeds at page 34, Umatilla County, Oreg.; covers 5 acres.

(*e*) J. G. Camp and Eva M. Camp, contractors (O. L. & W. Co. deed No. 179), dated May 10, 1916, and recorded in volume 99 of deeds at page 1, Umatilla County, Oreg.; covers 70 acres.

3. **Classes of charges for water rights.**—The water-right charges are of two kinds, to wit: (1) A charge against each irrigable acre to cover cost of additional construction for the irrigation system, termed the additional construction charge; and (2) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

4. **Additional construction charge.**—The additional construction charge shall be, for lands covered by the above-named agreements (*a*), (*b*), (*c*), and (*d*), $14 per irrigable acre, and for lands covered by the above-named agreement (*e*), $20 per irrigable acre. Said charges in each case shall be paid in 10 equal annual installments, the first of which shall be due and payable December 1, 1918, and subsequent installments on December 1 of each year thereafter.

5. **Advance payment of additional construction charge permissible.**—Any water contractor may, at his option, pay in advance the whole or any part of the additional construction charge owing by him within any shorter period than that prescribed by this notice.

6. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1918, and thereafter until further notice, shall be $1.50 per acre of irrigable land, whether water is used thereon or not, which will entitle the water user to 4 acre-feet of water per irrigable acre. Additional water will be furnished at the rate of 15 cents per acre-foot. All such charges will be payable on March 1 of each year for the preceding irrigation season.

7. **Place and method of payment of water-right charges.**—All water-right charges must be paid at the office of the United States Reclamation Service at Hermiston, Oreg., in cash, or by New York draft, or money order, payable to special fiscal agent, United States Reclamation Service.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, JANUARY 2, 1918.

1. **Supplemental construction.**—Under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, particularly section 4 of the reclamation extension act of August 13, 1916 (38 Stat., 686), all ot the water-right applicants and owners of the lands included in district No. 18 of the Umatilla project, Oregon, have made agreements providing for an increase in the cost of construction in the sum of $20 per irrigable acre. This increased cost is for the building of a 20-inch cement pipe line about 1,000 feet long, whereby water may be delivered as near as practicable to the commanding points of the various units in said district, all of which supplemental construction will involve a cost of not to exceed $20 per irrigable acre of land.

2. **Ratification.**—The said agreements are hereby ratified and confirmed, and the said increase in the construction charge of $20 per irrigable acre is hereby made effective in accordance with the conditions of the said agreements as herein specified.

3. **Lands affected.**—The lands in the district, all of which are subject to said increased charge, are described as follows:

T. 4 N., R. 28 E., W. M.—Section 10, W. ½ NW. ¼, SW. ¼ SE. ¼, N. ½ S. ½ SW. ¼., that portion of the S. ½ SE. ¼ SW. ¼, north of a line drawn parallel to and 250 feet from the north boundary of said S. ½ SE. ¼ SW. ¼.

4. **Payment of increased charge.**—Such increased charge of $20 per irrigable acre shall be added as a construction charge against the land in question and be paid in additional annual installments after the last of the installments now payable under the reclamation extension act, being four annual installments of $5 per irrigable acre each.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, JANUARY 26, 1918.

1. **Supplemental construction.**—Under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, particularly section 4 of the reclamation extension act of August 13, 1914 (38 Stat., 686), all of the water-right applicants and owners of the lands included in district No. 21 of the Umatilla project, Oregon, have made agreements providing for an increase in the cost of construction in the sum of $23 per irrigable acre. The increased cost is for the building of a 20-inch cement pipe line about 3,000 feet long, whereby water may be delivered as near as practicable to the commanding points of the various units in said district, all of which supplemental construction will involve a cost of not to exceed $23 per acre of irrigable land.

2. **Ratification.**—The said agreements are hereby ratified and confirmed, and the said increase in the construction charge of $23 per irrigable acre is hereby made effective in accordance with the conditions of the said agreements as herein specified.

3. **Lands affected.**—The lands in the district, all of which are subject to said increased charge, are described as follows:

T. 5 N., R. 29 E., W. M.—Section 21, SE. ¼ SW. ¼, and S. ½ SW. ¼ SW. ¼.

T. 4 N., R. 29 E., W. M.—Section 6, NE. ¼ NW. ¼, that portion of the NW. ¼ NE. ¼ west of a line drawn parallel to and 460 feet from the west boundary of said NW. ¼ NE. ¼; that portion of the W. ½ SW. ¼ NE. ¼ lying north of the diagonal road; that portion of the SE. ¼ NW. ¼ lying north of the diagonal road.

4. **Payment of increased charge.**—Such increased charge of $23 per irrigable acre shall be added as a construction charge against the land in question and be paid in additional annual installments after the last of the installments now payable under the reclamation extension act, being four annual installments of $5.75 per irrigable acre each.

FRANKLIN K. LANE,
Secretary of the Interior.

PUBLIC NOTICE, JANUARY 30, 1918.

1. **Supplemental construction.**—Under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, particularly section 4 of the reclamation extension act of August 13, 1914 (38 Stat., 686), a majority of the water-right applicants and owners of the lands included in district No. 20 of the Umatilla project, Oregon, have made agreements providing for an increase in the cost of construction in the sum of $23 per irrigable acre. This increased cost is for the building of a pipe line about 2,200 feet long, whereby water may be delivered as near as practicable to the commanding points of the various units in said district, all of which supplemental construction will involve a cost of not to exceed $23 per irrigable acre of land.

2. **Ratification.**—The said agreements are hereby ratified and confirmed, and the said increase in the construction charge of $23 per irrigable acre is hereby made effective in accordance with the conditions of the said agreements and as herein specified.

3. **Lands affected.**—The lands in the district, all of which are subject to said increased charge, are described as follows:

T. 4 N., R. 28 E., W. M.—Section 21, W. ½ NW. ¼ NE. ¼, NE. ¼ NW. ¼, that portion of the NW. ¼ NW. ¼ east of a line drawn parallel to and 800 feet from the east boundary of said NW. ¼ NW. ¼.

4. **Payment of increased charge.**—Such increased charge of $23 per irrigable acre shall be added to the construction charge against the land in question and be paid in additional annual installments after the last of the installments of the present construction charge, being four annual installments of $5.75 per irrigable acre each.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, FEBRUARY 6, 1918.

1. **Supplemental construction.**—Under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, particularly section 4 of the reclamation extension act of August 13, 1914 (38 Stat., 686), all of the water-right applicants and owners of the lands included in district No. 17 of the Umatilla project, Oregon, have made agreements providing for an increase in the cost of construction in the sum of $20 per irrigable acre. This increased cost is for the building

of a pipe line about 3,540 feet long, composed of about 640 linear feet of 20-inch and 2,900 linear feet of 16-inch cement pipe, whereby water may be delivered as near as practicable to the commanding points of the various units in said district, all of which supplemental construction will involve a cost of not to exceed $20 per irrigible acre of land.

2. **Ratification.**—The said agreements are hereby ratified and confirmed, and the said increase in the construction charge of $20 per irrigible acre is hereby made effective in accordance with the conditions of the said agreements and as hereinafter specified.

3. **Lands affected.**—The lands in the district, all of which are subject to said increased charge, are described as follows:

T. 5 N., R. 28 E., W. M.—Section 33, S. ½ SE. ¼, that portion of the S. ½ N. ½ S. ½ lying east of the Umatilla River; section 34, S. ½ NW. ¼ SW. ¼ N. ½ NE. ¼ SW. ¼ SW. ¼, W. ½ SW. ¼ SW. ¼.

4. **Payment of increased charge.**—Such increased charge of $20 per irrigable acre shall be added to the construction charge against the land in question and be paid in additional annual installments after the last of the installments of the present construction charge, being four annual installments of $5 each per irrigable acre.

Alexander T. Vogelsang,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, FEBRUARY 7, 1918.

[Effective Mar. 1, 1918.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplemental thereto, and particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), public notice for the third unit of the west extension, Umatilla project, Oregon, is hereby issued, as follows:

2. **Lands for which water will be furnished.**—Upon proper application being made therefor, water will be furnished under said project in the irrigation season of 1918, and thereafter, for the irrigable lands of the said third unit shown on the farm-unit plats of the following townships of the Willamette Meridian, to wit: T. 4 N., R. 25 E.; T. 5 N., R. 26 E.; T. 5 N., R. 27 E.; which plats were approved by the Secretary of the Interior on the date of this notice, and are on file in the office of the project manager, United States Reclamation Service, Hermiston, Oreg., and the local land office at The Dalles, Oreg.

3. **When and how to make entry for public land.**—Homestead entries for the farm units shown on said plats embracing public lands of the United States may be made beginning March 6, 1918, at 9 o'clock a. m., at the local land office of the district within which said land is situated. Every person desiring to acquire any of said public lands must execute a homestead application subject to the provisions of the reclamation law in manner required by law, which, with the required fees and commissions, accompanied by certificates of the project manager as to the filing of water-right application and payment of water-right charges as hereinafter provided, may be presented to said local land office, in person, by mail, or otherwise, within a period of five days prior to the opening, to wit: On and from March 1, 1918, to and including 9 o'clock a. m., March 6, 1918.

Applications presented after 9 o'clock a. m., March 6, 1918, will be filed and noted in the order of their receipt. Any applications not based on a prior settlement right will be subject to valid settlement claims asserted in the manner required by law.

4. **Simultaneous filings for public land.**—Applications reaching said local land offices during said period of five days, will be held and treated as simultaneously filed, and the register and receiver will dispose of them as follows:

(*a*) Where there is no conflict the application will be allowed, irrespective of whether settlement is alleged.

(*b*) In case of conflicting applications and only one of the applicants alleges prior settlement his application will be allowed, and the others rejected.

(*c*) If two or more conflicting applications, each containing allegations of prior settlement, are received, a hearing, restricted to those alleging such right, will be ordered to determine the priority of right.

(*d*) Where there are conflicting applications in which no one of the several applicants claims prior settlement the register and receiver will write on cards the names of the several applicants, and each of these cards will be placed in an envelope upon which there is no distinctive or identifying mark, and at 2 o'clock p. m., on the date of opening to entry, if practicable (if not, at the same hour one day later), after all the envelopes containing the names of the several applicants shall have been thoroughly mixed in the presence of such persons as may desire to be present, they will be drawn and numbered in order. The cards as drawn and numbered will be securely fastened to the applications of the respective persons, and the applications will be allowed in such order. Applications conflicting in whole with those previously allowed will be rejected in the usual manner.

5. **Failure of applicant to obtain public land applied for.**—Where any applicant fails to obtain land applied for by him he will be permitted to elect whether he will amend his application to embrace other lands not affected by pending applications and otherwise subject thereto when such amended application is presented, or withdraw his original application without prejudice. In the event of such withdrawal the fees and commissions will be returned by the receiver, and the water-right charges deposited will be returned by the project manager, upon surrender of the certificate of filing issued by the project manager.

6. **Warning against unlawful settlement upon public land.**—No person will be permitted to gain or exercise any right whatever under any settlement or occupation of any of said public lands, begun at or prior to 9 a. m., March 6, 1918, provided, however, that this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

7. **Limit of area for which water right may be secured.**—The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such lands, is fixed as shown upon the plats for the several farm units. The maximum limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each land owner.

8. **Application for water right.**—All water-right applications, whether for public or private lands, must be made to the project

manager, United States Reclamation Service, Hermiston, Oreg., upon forms provided for that purpose, and may be made on and after the date upon which this notice becomes effective as herein prescribed. In the case of public lands, each water-right application must be for a specified farm unit, and more than one person may make such application for the same farm unit. A certificate of filing will be issued each applicant by the project manager. Filing of water-right application and issuance of certificate give no preference right to entry on public lands. Only when the project manager is notified by the local land office that an entry has been allowed, will acceptance of the water-right application be indorsed thereon. Whereupon all other water-right applications affecting the farm unit in question, with payments made, will be returned to the respective applicants, upon surrender by them of the certificates of filing issued by the project manager.

9. **Classes of charges for water rights.**—The water-right charges are of two kinds, to wit: (1) A charge against each irrigable acre to cover cost of construction of the irrigation system; and (2) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system.

10. **Construction charge.**—The construction charge shall be $92 per acre of irrigable land, payable as follows:

(*a*) For lands that were entered on or before Ausust 13, 1914, subject to the reclamation act, or on or prior to that date were subjected by contract, trust, deed, decree of court or otherwise to the provisions of the reclamation law, said construction charge shall be paid in not more than 10 equal annual installments, the first of which shall be paid at the time of filing water-right application, the second of which shall be paid December 1 of the following year, and subsequent installments shall be paid December 1 of each year thereafter; *Provided, however,* That if water-right application subject to the provisions of said reclamation extension act, or an acceptance of the provisions of same in accordance with section 14 thereof, be filed within six months from the date upon which this notice becomes effective, said construction charge shall be payable in 20 annual installments, the first of which shall become due and payable on December 1 following the date of water-right application, and subsequent installments on December 1 of each year thereafter, in which event the first four installments shall each be 2 per cent, the next two installments shall each be 4 per cent, and the next fourteen each 6 per cent of the total construction charge.

(*b*) For the remaining lands an initial payment of 5 per cent of the construction charge shall be made at the time of filing water-right application, and the remainder of the construction charge shall be paid in 15 annual installments, the first five of which shall each be 5 per cent and the remainder each 7 per cent of the total construction charge. The first of said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

11. **Increased construction charge in certain cases.**—In all cases where water-right application for lands in private ownership or for lands under entries not subject to the reclamation law, shall not be made within one year from the date upon which this notice becomes effective, the construction charge for such lands shall be increased 5

per cent each year until such application is made and an initial installment is paid.

12. **Advance payment of construction charge permissible.**—Any water-right applicant may, at his option, pay in advance the whole or any part of the construction charge owing by him within any shorter period than that prescribed by this notice.

13. **Operation and maintenance charges.**—The operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice, shall be $1.50 per acre of irrigable land whether water is used thereon or not, which will entitle the water user to 4 acre-feet of water per irrigable acre. Additional water supply will be furnished at the rate of 15 cents per acre-foot. All such charges will be payable on March 1 of each year for the preceding irrigation season, except that when water-right application is filed for public lands entered after June 15 in any year, the first payment of such charge becomes due March 1 of the second year thereafter.

14. **Place and method of payment of water-right charges.**—All water-right charges must be paid at the office of the United States Reclamation Service at Hermiston, Oreg., in cash, or by New York draft, or money order, payable to the special fiscal agent, United States Reclamation Service.

15. **When notice is effective.**—This notice shall become effective on March 1, 1918, and shall be in full force and effect on and after that date.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, FEBRUARY 16, 1918.

1. **Supplemental construction.**—Under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof, and supplementary thereto, particularly section 4 of the reclamation extension act of August 13, 1914 (38 Stat., 686), a majority of the water-right applicants and owners of the lands included in district No. 22 of the Umatilla project, Oregon, have made agreements providing for an increase in the cost of construction in the sum of $20 per irrigable acre. This increased cost is for the construction of a distributary consisting of about 3,600 linear feet of cement-lined lateral, about 500 feet of 20 and 30 inch cement pipe line, and about 2,200 linear feet of unlined canal, whereby water may be delivered as near as practicable to the commanding points of the various units in said district, all of which supplemental construction will involve a cost of not to exceed $20 per irrigable acre of land.

2. **Ratification.**—The said agreements are hereby ratified and confirmed and the said increase in the construction charge of $20 per irrigable acre is hereby made effective in accordance with the conditions of the said agreements and as herein specified.

3. **Lands affected.**—The lands in the district, all of which are subject to said increased charge, are described as follows:

T. 4 N., R. 28 E., W. M.—Section 2, S. ½ SW. ¼, NW. ¼, SW. ¼; Section 3, W. ½ SE. ¼, SE. ¼ SE. ¼, S. ½ NE. ¼ SE. ¼; fractional NE. ¼ SW. ¼ east of the right of way of the O-WR. & N. Co.

4. **Payment of increased charge.**—Such increased charge of $20 per irrigable acre shall be added to the construction charge against the

land in question and be paid in additional annual installments after the last of the installments of the present construction charge, being four annual installments at $5 per irrigable acre each.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, MARCH 8, 1918.

1. **Supplemental construction.**—Under the provisions of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof, and supplementary thereto, particularly section 4 of the reclamation extension act of August 13, 1914 (38 Stat., 686), a majority of the water-right applicants and owners of the lands included in district No. 19 of the Umatilla project, Oregon, have made agreements providing for an increase in the cost of construction in the sum of $21 per irrigable acre. This increased cost is for the building of a 20-inch cement pipe line about 1,700 feet long, whereby water may be delivered as near as practicable to the commanding points of the various units in said district, all of which supplemental construction will involve a cost of not to exceed $21 per irrigable acre of land.

2. **Ratification.**—The said agreements are hereby ratified and confirmed and the said increase in the construction charge of $21 per irrigable acre is hereby made effective in accordance with the conditions of the said agreements as herein specified.

3. **Lands affected.**—The lands in the district, all of which are subject to said increased charge, are described as follows:

T. 5 N., R. 28 E., W. M.—Section 34, SE. ¼ NE. ¼; also that portion of the NE. ¼ SE. ¼ lying north of a line drawn parallel to and 560 feet south from the north boundary of said NE. ¼ SE. ¼.

4. **Payment of increased charge.**—Such increased charge of $21 per irrigable acre shall be added as a construction charge against the land in question and be paid in additional annual installments after the last of the installments of the present construction charge, being four annual installments of $5.25 per irrigable acre each.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, APRIL 3, 1918.

1. **Annual operation and maintenance charge.**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice against all lands of the Umatilla project, Oregon, under public notice (except lands of the third unit, west extension, under public notice, dated February 7, 1918) shall be a minimum charge of $1.75 per irrigable acre, whether water is used thereon or not, which minimum charge will entitle the water user to not exceeding 4 acre-feet of water per irrigable acre; additional supplies to be furnished for 50 cents per acre-foot. All operations and maintenance charges under the project will be due and payable on March 1 following the irrigation season; but where water-right application is made for

public land entered under the reclamation law after June 15, or where water-right application is made after August 1 for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which water-right application is made.

E. C. Bradley,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Umatilla project, June 30, 1918.

Cash		$14,321.34
Inventory of stock on hand		14,811.19
Accounts receivable		1,154,981.12
Construction cost	$2,377,299.10	
Less construction revenue earnings	33,295.56	
		2,344,003.54
Operation and maintenance cost	303,755.74	
Less operation and maintenance revenue earnings	24,558.07	
		279,197.67
Total		3,807,314.86
Accounts payable		6,240.91
Contingent obligations		14,321.34
Reserves for repayment to reclamation fund of cost of project		1,519,957.38
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	2,834,302.53	
Collection, transfer, refund, and joint construction vouchers issued	567,507.30	
Net investment		2,266,795.23
Total		3,807,314.86

Feature costs of Umatilla project to June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys:		
East side		$50,733.79
West side		64,476.71
		115,210.50
Storage works, east side:		
Diversion dam and works		33,284.92
Feed canal		341,410.56
Cold Springs Dam and Reservoir		464,644.11
	[1] $101.72	839,339.59
Canal system:		
Canal A, east side		45,477.85
Maxwell diversion dam and works, east side		4,569.04
Maxwell Canal, east side		37,684.83
Three Mile Falls diversion dam and works, west side		73,586.05
Main canal, west side		487,423.31
	[1] 6,930.59	648,741.08
Lateral system:		
East side, supplemental construction	9,915.06	41,378.71
East side laterals	[1] 4,062.19	428,927.00
West side laterals	27,538.73	184,709.36
	33,371.60	655,015.07
Drainage system:		
Hermiston drain		44,010.69
Second unit drain		3,174.60
Hat Rock drain		1,604.65
Umatilla drain		6,022.69
	[1] 2,382.90	54,812.63

[1] Deduct.

Feature costs of Umatilla project to June 30, 1918—Continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Farm units:		
East side		$1,878.28
West side	$333.72	1,272.91
	333.72	3,151.19
Permanent improvements:		
Frame buildings, Hermiston	604.85	8,546.12
New office building, Hermiston		6,454.70
Feed canal headquarters		3,019.96
Cold Springs Dam buildings		3,573.39
Demonstration farm buildings		3,421.47
Warehouse, Irrigon		917.21
Ditchrider's quarters, Boardman	2,794.56	2,794.56
	3,399.41	28,727.41
Telephone system, west side		2,670.87
Plant accounts	103.65	5,876.64
Unadjusted clearing accounts	1,717.41	4,432.12
Operation and maintenance charges transferred to and compounded with construction charges	[1] 202.80	19.322.00
Gross construction cost to June 30, 1918	29,357.78	2,377,299.10
Less revenues earned during construction period:		
Rental of buildings	[2] 4,272.25	769.00
Rental of grazing and farming lands	117.50	22,129.46
Rental of irrigation water		80.00
Contractors' freight refunds		1,055.31
Other revenues, unclassified	228.07	10,288.07
Loss on hospital operations	[2] 821.15	[2] 1,026.28
	[2] 4,747.83	33,295.56
Net cost of construction of project to June 30, 1918		2,344,003.54

[1] Deduct.

[2] Credit-equipment adjustment.

Statement of cost by calendar years, Umatilla project.

Year ending Dec. 31—	Construction.	Operation and maintenance under public notice.	Total cost.
1907	$628,021.43		$628,021.43
1908	342,724.04	$21,533.97	364,258.01
1909	110,049.68	27,209.09	137,258.77
1910	81,557.21	30,724.15	112,281.36
1911	134,764.17	30,538.32	165,302.49
1912	93,190.64	27,140.45	120,331.09
1913	71,021.46	32,737.93	103,759.39
1914	314,071.70	26,334.68	340,406.38
1915	299,696.13	24,704.45	324,400.58
1916	187,204.25	28,601.92	215,896.17
1917	69,480.49	42,178.08	111.658.57
January to June 30, 1918	15,797.14	29,036.24	44,833.38
Plant accounts	5,876.64	2,338.46	8,215.10
Unadjusted clearing accounts	4,432.12		4,432.12
Operation and maintenance added to construction	19,322.00	[1] 19,322.00	
Total	2,377,299.10	303,755.74	2,681,054.84

[1] Deduct.

Statement of cost by fiscal years, Umatilla project.

Year ending June 30—	Construction.	Operation and maintenance under public notice.	Total cost.
1908	$882,041.86	$8,593.98	$890,635.84
1909	128,965.20	26,484.38	155,449.58
1910	116,039.24	26,546.55	142,585.79
1911	105,634.29	33,554.23	139,188.52
1912	113,636.13	28,444.26	142,080.39
1913	88,061.26	29,822.46	117.883.72
1914	102,389.31	30,981.80	133,371.11
1915	363,622.67	25,817.38	389,440.05
1916	247,938.43	23,842.94	271,781.37
1917	171,600.43	35,637.59	207,238.02
1918	29,357.78	53,554.97	82,912.75
Plant accounts on June 30, 1917	5,772.99		5,772.99
Unadjusted clearing accounts on June 30, 1917	2,714.71		2,714.71
Operation and maintenance added to construction on June 30, 1917	19,524.80	[1] 19,524.80	
Total	2,377,299.10	303,755.74	2,681.054.84

[1] Deduct.

Estimated cost of contemplated work, Umatilla project, during fiscal year 1919.

Features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys: Investigating additional storage		$8,000
Lateral system:		
Supplemental construction, east side	$20,000	
Laterals, west side	18,000	
		38,000
Drainage system, west side		6,000
Farm units, west side		1,000
Permanent improvements, Three Mile Falls diversion dam quarters		2,000
Operation and maintenance under public notice		50,000
Total		105,000

Operating costs and revenues, Umatilla project, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works, east side	$2,955.13	$342.56	$3,297.69	$53,664.29	$44,164.21	$97,828.50
Canal system, west side	3,845.83	4,233.85	8,079.68	4,882.78	9,804.58	14,687.36
Lateral system:						
East side	6,941.05	12,325.59	19,266.64	51,620.35	118,853.70	170,474.05
West side	1,391.02	4,287.61	5,678.63	3,067.18	6,317.92	9,385.10
	8,332.07	16,613.20	24,945.27	54,687.53	125,171.62	179,859.15
Drainage, east side		775.76	775.76		8,554.96	8,554.96
Undistributed expenses, hydrometry, damage claims, and general expenses	6,701.21	6,970.09	13,671.30	8,601.97	7,880.63	16,482.60
Permanent improvements		244.01	244.01		3,326.71	3,326.71
Plant accounts		2,338.46	2,338.46		2,338.46	2,338.46
Subtotal	21,834.24	31,517.93	53,352.17	121,836.57	201,241.17	323,077.74
Less unpaid operation and maintenance charges added to construction			202.80			[1] 19,322.00
Total	21,834.24	31,517.93	53,554.97	121,836.57	201,241.17	303,755.74

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$22,605.65	$124,911.49
Operation and maintenance charges paid in advance by water-right applicants	[1] 634.72	1,755.88
Operation and maintenance charges paid and forfeited by water-right applicants	492.50	1,690.73
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	929.26	2,365.77
Rental of land and buildings during operating period	4,755.25	4,755.25
Rentals of irrigation water	4,580.90	17,956.50
Other revenues unclassified, earned during operating period	794.44	1,846.32
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants	[1] 548.69	[1] 1,052.18
Total	32,974.59	154,229.76
Difference (deficit)	20,580.38	149,525.98

[1] Deduct.

OREGON-CALIFORNIA, KLAMATH PROJECT.

J. B. BOND, project manager, Klamath Falls, Oreg.

LOCATION.

Counties: Klamath, Oreg.; Siskiyou and Modoc, Cal.

Townships: 38 to 41 S., Rs. 8 to 14 E., Willamette meridian; 46 to 48 N., Rs. 1 to 8 E., Mount Diablo meridian.

Railroad: California Northeastern, Klamath Falls Municipal Railway.

Railroad stations and estimated population June 30, 1918: Klamath Falls, 5,500; Midland, 50; and Olene, Oreg., 50.

WATER SUPPLY.

Source of water supply: Upper Klamath Lake, Lost River, and Clear Lake.

Area of drainage basin: 3,700 square miles.

Annual run-off in acre-feet, 1904 to 1917: Link River at Klamath Falls (3,110, square miles)—Maximum, 2,144,200; minimum, 1,216,000; mean, 1,642,000. Lost River and Willow Creek at Clear Lake, Cal.—Maximum, 252,000; minimum, 34,700; mean, 135,000. Lost River at Olene, Oreg.—Maximum, 473,500; minimum, 128,000; mean, 263,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1918, 50,000 acres.

Area under water-right applications, season of 1918, 38,237 acres.

Area under special contract, season of 1918, 6,000 acres.

Length of irrigation season: From April 15 to September 30—168 days.

Average elevation of irrigable area: 4,100 feet above sea level.

Average annual rainfall on irrigable area, 10 years: 13.4 inches.

Range of temperature on irrigable lands:—10° to 100° F.

Character of soil of irrigable area: Disintegrated basalt, volcanic ash, and diatomaceous earth, being largely classified as Yakima sandy loam.

Principal products: Alfalfa, hay, grain, and vegetables; stock, poultry, and dairy products.

Principal markets: Portland, Oreg.; Sacramento and San Francisco, Cal.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: November 18 and December 7, 1908; August 24, 1909; June 9, 1910; March 23, and September 24, 1914; March 26 and September 15, 1915; March 9 and 16, 1916; February 12, March 9 and 31, 1917; March 13, 1918.

Location of lands opened: T. 38 S., R. 9 E.; 39 S., Rs. 8 to 11½ E.; 40 S., Rs. 9 to 11 E.; 41 S., Rs. 10 to 12 E., Willamette meridian, and 48 N., R. 5 E., Mount Diablo meridian.

Limit of area of farm units: 160 acres.

Duty of water, 1.8 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land, $30 for the first and second units, $39 and $45 for the third unit.

Annual operation and maintenance charge, season of 1918, minimum charge $1.25 per acre for 2 acre-feet, 40 cents for first additional acre-foot, and 60 cents per acre-foot thereafter.

CHRONOLOGICAL SUMMARY.

Reconnoisance made in October and November, 1903.

Preliminary surveys begun in 1904.

Construction recommended by a board of engineers May 1, 1905.

Construction authorized by Secretary May 15, 1905.

Main canal completed August, 1907.

First irrigation by Reclamation Service season of 1907.

Keno Canal completed October, 1908.

South Branch Canal completed March, 1909.

Clear Lake Dam completed January, 1910.

Lost River Diversion Dam completed June, 1912.

Adams Canal enlargement begun October, 1913, completed April, 1914.

Second unit lateral system begun October, 1912, completed June, 1915.

G Canal (enlargement of Griffith Lateral), begun March 8, 1915, completed April, 30, 1915.

Lateral, margin of Tule Lake, begun June 5, 1916, completed June 30, 1917.

Entire project 58 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Klamath project provides for storage of water in the natural reservoir of Upper Klamath Lake, lying just north of Klamath Falls, Oreg., and in the Clear Lake Reservoir, Cal., at the head of Lost River and 6 miles east of Tule Lake. Water for irrigation is diverted from the east side of Link River the outlet of Upper Klamath Lake, 700 feet from the lake, into the Main (A) Canal, which extends 9 miles in a southeasterly direction, supplying canals and laterals in the first unit of the project, and a portion of the second unit in Poe Valley and on Nuss Lateral. The water diverted from Lost River into the Griffith (G) Canal at the Lost River Dam, 10 miles southeast from Klamath Falls, Oreg., supplies the lands under that canal in the second unit and also the Adams Canal, which covers the portion of the first unit east of Lost River, the lands on the margin of Tule Lake in private ownership, and a portion of the bed of Tule Lake in public ownership.

The United States claims all waste, seepage, unappropriated spring and percolating water arising within the project, and proposes to use such water in connection therewith.

Clear Lake Dam and dikes were built mainly to withhold the waters of Lost River from Tule Lake, into which that river empties. The water stored in the Clear Lake Reservoir will be released into Lost River whenever needed for irrigation. Tule Lake has no visible outlet, and it is proposed to reclaim about 30,000 acres of the lake bed by evaporation. To assist in this, the Lost River Diversion Dam and channel (8 miles long) were built to divert the flood waters of Lost River into Klamath River.

The present irrigation system consists of 237.1 miles of canals and laterals, 89.1 miles of open drains, and 8.2 miles of closed drains. These works cover 29,500 acres of irrigable land in the first unit, 7,482 acres of irrigable land in the second unit, and 5,930 acres of irrigable land in the third unit; also about 1,100 acres of irrigable land in public ownership in the former bed of Tule Lake, not yet under public notice, and 6,000 acres of districts under special contract, a total irrigable area of 50,000 acres.

As the reclamation of the bed of Tule Lake progresses a second diversion dam will be built in Lost River about 15 miles nearly south from the first dam. This will divert water east and west on the reclaimed area of the lake bed.

A canal known as the Keno Power Canal was built on the west bank of Link River, in Klamath Falls, Oreg., diverting water from the river 1,200 feet from its outlet from Upper Klamath Lake. This canal, primarily designed for power purposes, was also planned to furnish water for irrigating lands on the west side of Klamath River, southwest from Klamath Falls, Oreg. No power plant, however, has been installed by the Government, as all irrigation at present is by gravity flow. This power canal has been leased to the California-Oregon Power Co. for 10 years with privilege of renewal, at a rental of $1,000 per annum and the further consideration of rates for power for pumping for irrigation within the project of 0.7 cent per kilowatt hour for units of 100 horsepower or over.

An undeveloped power site is located at the drop from the Main (A) Canal into the South Branch (C) Canal, 9 miles southeast from Klamath Falls, Oreg.

The principal features of the project are the Clear Lake Reservoir, the Lost River diversion works, the Keno Power Canal, the Main Canal Tunnel, 3,300 feet long, and the main canals of the distributing system.

SUMMARY OF GENERAL DATA FOR KLAMATH PROJECT, TO END OF FISCAL YEAR 1918.

Areas:		
Irrigable acreage when project is complete		141,682
Public land entered to end of fiscal year	2,651	
Public land open to entry at end of fiscal year	132	
Public land withdrawn at end of fiscal year	27,300	
Private land	111,599	
Acreage service could have supplied, season of 1917		44,000
Addition in fiscal year 1918		6,000
Estimated addition in fiscal year 1919		7,000
Estimated acreage service can supply July 1, 1919		57,000
Acreage actually irrigated, season of 1917		33,635
Acreage cropped under irrigation, season of 1917		32,929

Crops:

Value of irrigated crops, season of 1917	$847,200
Value of irrigated crops, per acre cropped	25.73

Finances:

Net construction cost to end of fiscal year			$2,913,053.13
Per cent complete at end of fiscal year			58
Appropriated for fiscal year 1919, total			$423,000
Allotment for construction, fiscal year 1919			$96,500
Estimated per cent complete, June 30, 1919			63
Proposed appropriation, fiscal year 1920, for construction			$253,300
Estimated total construction cost to June 30, 1920			$3,332,800
Estimated per cent complete, June 30, 1920			67
Announced construction charges per acre			$30, $39, $45
Appropriation, fiscal year 1918			$239,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$136,099.53		
Transfers	9,228.16		
		$145,327.69	
Registered liabilities chargeable to 1918 appropriation		24,772.76	
			170,100.45
Unencumbered balance, July 1, 1918			68,899.55

Repayments:

Value of construction, water-right contracts	$1,584,280.89
Construction charges—	
Accrued to end of fiscal year	[1] 342,295.64
Collected to end of fiscal year	[2] 340,319.66
Uncollected at end of fiscal year	[3] 1,975.98
Operation and maintenance charges (public notice)—	
Accrued to end of fiscal year	219,055.15
Collected to end of fiscal year	[4] 201,957.75
Uncollected at end of fiscal year	17,097.40
Water-rental charges—	
Accrued to end of fiscal year	37,219.56
Collected to end of fiscal year	37,062.22
Uncollected at end of fiscal year	157.34
Power earnings—	
Accrued to end of fiscal year	2,020.00
Collected to end of fiscal year	2,020.00

Drainage:

Estimated acreage damaged by seepage to end of fiscal year		7,000
Miles of drains built to end of fiscal year—		
Open	89.1	
Closed	8.2	
Total		97.3
Estimated acreage protected by drains built to end of fiscal year		18,800
Estimated acreage to be protected by authorized system		29,600
Cost of drainage works to end of fiscal year		$368,432.94

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[1] Includes $527.50 supplemental construction charges accrued, to be collected as operation and maintenance.

[2] Includes $113.75 supplemental construction collected as operation and maintenance.

[3] Includes $413.75 operation and maintenance supplemental construction charges uncollected.

[4] Includes $6,705.07 for work taken up on joint construction vouchers.

CONSTRUCTION DURING FISCAL YEAR.

During the fiscal year 1918 the following supplemental construction was under way in the first unit: Drains Nos. 3, 5 H, 10, 11, and 20 were completed; a metal flume 3 feet 3 inches in diameter and 1,260 feet in length was erected on the C–4–b lateral; 1½ miles of new lateral were constructed to serve additional lands.

Under the third unit several minor timber structures were erected and 3 miles of laterals, having a capacity of 10 second-feet, were constructed. All of the work under way was handled with Government forces.

SEEPAGE AND DRAINAGE.

Drainage work on the first unit was continued with 2 drag lines and 1 trenching machine operating during portions of the year. This work was 78 per cent completed at the end of the fiscal year, 89.1 miles of open drain and 8.2 miles of closed drain having been built up to that time. The drains protect an area estimated at 18,800 acres of irrigable land.

BOARD MEETINGS.

Date.	Subject.	Personnel.
1918.		
Mar. 27	Contract with Klamath irrigation district	D. C. Henny, H. L. Holgate, A. H. Gullickson, and J. B. Bond.
Mar. 30	Drainage of Van Brimmer lands	D. C. Henny, A. H. Gullickson and J. B. Bond.
Apr. 1	Drainage of second unit lands	D. C. Henny and J. B. Bond.

OPERATION AND MAINTENANCE.

In May and June, 1918, 2,000 acre-feet of stored water were released from the Clear Lake Reservoir for lands in Langell's Valley, Oregon, holding vested rights. The run-off from Link and Lost Rivers has proved sufficient to supply all project demands.

The operating season for 1917 opened May 22 and closed September 30, 1917.

The spring of 1918 was unusually dry and much warmer than usual, and the demand for water to the end of the fiscal year has been heavier than in previous years. The operating season began April 15, 1918.

The maintenance work consisted of cleaning canals of silt and weeds, repairing breaks, and replacing and repairing timber structures. Owing to high winds, the amount of silt removed was much in excess of the usual quantity, and some portions of the canals and laterals were cleaned where it had not been required the previous season.

A serious break occurred in the A canal on the Anna Thomas place, where 2,000 cubic yards of earth had to be hauled about 2,000 feet for repairs; on the B canal and on the D canal one break each occurred, which were repaired with the loss of only one day's water service in each case.

Historical review, Klamath project.

Item.	1913	1914	1915	1916	1917	1918
Acreage for which Service was prepared to supply water	29,700	35,400	36,000	40,000	44,000	50,000
Acreage irrigated	18,928	24,440	27,254	29,351	33,635	....
Number of farms irrigated	325	333	315	350	402	....
Miles of canal operated	132	178	187	216	216	....
Water diverted (acre-feet)	38,000	56,750	68,830	66,010	65,368	....
Water delivered to land (acre-feet)	22,160	25,610	30,640	29,970	32,780	....
Per acre of land irrigated (acre-feet)	1.17	1.05	1.125	1.02	0.975	....

SETTLEMENT.

On June 30, 1918, only two farm units remained unentered. All the entrymen have improved their holdings and the greater portion of the entered lands are in crops for the season of 1918.

Settlement data, Klamath project.

Item.	1913	1914	1915	1916	1917	1918
Total number of farms on project	350	373	391	409	527	560
Population	1,125	1,375	1,520	1,580	1,610	[1] 1,990
Number of irrigated farms	325	333	352	409	527	[1] 530
Operated by owners or managers	259	250	247	287	336	[1] 340
Operated by tenants	66	83	105	122	191	[1] 190
Population	1,050	1,300	1,425	1,485	1,490	[1] 1,500
Number of towns	4	4	4	4	4	4
Population	5,300	4,500	4,700	5,000	5,650	6,000
Total population in towns and on farms	6,425	5,875	6,220	6,580	7,260	7,990
Number of public schools	16	18	19	20	20	20
Number of churches	9	9	9	9	9	10
Number of banks	3	3	3	3	3	4
Total capital stock	$175,000	$175,000	$175,000	$175,000	$175,000	$225,000
Amount of deposits	....	$1,000,000	$1,118,500	$1,219,846	$1,390,000	$2,383,000
Number of depositors	....	2,600	3,565	4,281	5,310	6,264

[1] Estimated.

PRINCIPAL CROPS.

During 1917 the area irrigated and cropped was 32,929 acres. The value of irrigated crops reported was $847,200, as compared with $509,865 in 1916. Of the acreage planted to sugar beets, reports were made on 54 acres which produced 549 tons, an average yield of 10.2 tons per acre, with a maximum yield of 30 tons per acre.

The season of 1918 promises well for irrigated crops, the weather being warmer than usual to June 30, 1918, with no frosts except on May 19 and 25. These caused no loss to field crops and no very serious damage to gardens and fruits, except on low ground, where the killing of fruit was nearly complete.

Crop report, Klamath project, Oregon-California, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	9,811	Ton	31,158	3.1	$15.00	$467,370	$47.60
Barley	6,153	Bushel	109,259	17.7	1.08	118,000	19.20
Fruit	32					800	25.00
Garden	106					6,650	62.70
Hay	1,971	Ton	2,837	1.44	15.00	42,555	21.60
Oats	3,238	Bushel	82,708	25.5	.80	66,166	20.40
Pasture	7,836					35,262	4.50
Potatoes	229	Bushel	24,323	106.2	.85	20,674	90.30
Rye	678	...do	4,896	7.2	1.82	8,911	13.20
Wheat	2,821	...do	39,753	14.1	1.95	77,518	27.50
Sugar beets	54	Ton	549	10.2	6.00	3,294	61.00
Total cropped	32,929	Total and average				847,200	25.73

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, not cropped	706	Irrigable area farms reported	38,936		
Total irrigated	33,635	Irrigated farms reported	33,635	402	
		Under water-right applications		398	
		Under rental contracts		4	
		Cropped area farms reported	32,929	402	

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, MARCH 13, 1918.

1. **Annual operation and maintenance charges.**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice, against all lands of the Klamath project, Oregon-California, under public notice, shall be a minimum charge of $1.25 per irrigable acre whether water is used thereon or not, which will entitle the water user to 2 acre-feet of water per irrigable acre; and that additional water will be furnished up to a limit of 3 acre-feet per irrigable acre at the rate of 40 cents per acre-foot, and all further quantities for 60 cents per acre-foot. All operation and maintenance charges are payable on March 1 for the preceding irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15, and where water-right application is made after August 1 for land in private ownership, no operation and maintenance charge shall be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Klamath project, June 30, 1918.

Cash		$150.00
Inventory of stock on hand		40,533.11
Accounts receivable		1,262,701.50
Construction work cost	$2,973,053.52	
Less cost adjustments	60,000.39	
		2,913,053.13
Operation and maintenance cost	285,026.01	
Less operation and maintenance revenue earnings	6,434.42	
		278,591.59
Total		4,495,029.33
Accounts payable		24,887.41
Contingent obligations		150.00
Reserves for repayment to reclamation fund of cost of project		1,807,775.94
Capital investment:		
Disbursement, transfer, and joint-construction vouchers received	$3,311,288.74	
Collection, transfer, refund, and joint-construction vouchers issued	649,072.76	
Net investment		2,662,215.98
Total		4,495,029.33

Feature costs of Klamath project, to June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys:		
Project as a whole	$5,288.61	$52,645.05
Modoc unit		5,624.34
Experimental farm		16,236.55
Tule Lake outlets	277.21	21,214.08
Horsefly irrigation district		161.10
Stream gaging	[1] 2,045.26	25,887.63
Sand Hollow investigations	[1] 40.58	676.40
Sand Hollow investigations, cooperative		830.29
Upper Klamath Lake	[1] 163.77	4,601.72
Tule Lake, north shore	[1] 1,653.54	
Pine Grove		87.42
Ground-water surveys	[1] 88.56	
J-canal headworks	[1] 35.32	
South Branch cut-off	[1] 63.09	
	1,475.70	127,964.58
Storage works:		
Clear Lake Dam and dikes		332,354.88
Horsefly reservoir site		670.49
		333,025.37
Canal system:		
Main canal		696,968.88
East Branch canal		49,639.53
South Branch canal		193,495.09
Adams and Carr canals	127.24	182,384.57
Lost River diversion channel	104.22	308,312.69
Griffith canal enlargement	329.92	82,770.17
Ankeny canal		57,090.00
Langell Valley canals		9,834.23
Second unit minor structures		30.79
J canal	812.62	812.62
J-canal headworks	230.06	230.06
South Branch cut-off	265.82	265.82
Supplemental construction, first unit	67.92	1,860.11
	1,937.82	1,583,696.58
Lateral system:		
First unit		150,820.54
Second unit	273.68	114,385.34
Third unit	8,169.38	41,395.28
Supplemental construction, first unit	6,199.60	21,174.68
	14,642.66	327,775.84

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[1] Deduct

Feature costs of Klamath project, to June 30, 1918—Continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Drainage system:		
First unit		$112,282.89
Second unit		437.74
Langell Valley		428.16
Lower Klamath Lake		9,147.28
Pumping unit		2,650.02
Supplemental construction, first unit	$83,648.10	[2] 243,486.85
	83,648.10	368,432.94
Power system:		
Keno canal		111,329.02
South Branch power plant		740.10
McCormick tract		11,424.62
Leavitt tract		3,415.38
		126,909.12
Farm units:		
Second unit		2,609.15
Third unit		1,640.19
Marginal lands below third unit	334.87	334.87
	334.87	4,584.21
Permanent improvements headquarters		20,043.72
Telephone system, project as a whole		26,185.87
Operation and maintenance during construction (water-rental basis)	1,574.12	31,921.30
Balance in plant accounts	[1] 8,358.41	20,856.77
Unadjusted clearing accounts	[1] 42.79	108.64
Operation and maintenance charges transferred to and compounded with construction charges	281.63	1,551.58
Gross construction cost to June 30, 1918	95,493.70	2,973,053.52
Less revenues earned during construction period:		
Rental of buildings	[1] 85.00	144.50
Rental of grazing and farming lands	8,419.45	17,448.47
Rentals of irrigation water		31,821.45
Contractors' freight refunds		8,555.71
Other revenues, unclassified	.66	902.71
Profit on hospital operations	595.50	1,127.55
	8,930.61	60,000.39
Net cost of contruction of project to June 30, 1918		2,913,053.13

[1] Deduct.

[2] Includes $16,597.10 cost of supplemental construction in former years transferred to this account in 1918.

Statement of cost by calendar years, Klamath project.

Year ending Dec. 31—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1904	$11,498.31				$11,498.31
1905	65,987.53				65,987.53
1906	531,011.27				531,011.27
1907	675,762.74		$12,430.27	$12,430.27	688,193.01
1908	274,708.96		20,089.92	20,089.92	294,798.88
1909	246,820.94		21,735.08	21,735.08	268,556.02
1910	96,939.10		20,000.49	20,000.49	116,939.59
1911	261,951.81		20,981.02	20,981.02	282,932.83
1912	90,651.76		16,419.59	16,419.59	107,071.35
1913	155,449.28		18,780.80	18,780.80	174,230.08
1914	77,941.36	$9,611.63	31,898.26	41,509.89	119,451.25
1915	142,285.42	12,251.77	36,790.54	49,042.31	191,327.73
1916	139,951.49	7,338.52	13,635.90	20,974.42	160,925.91
1917	100,415.35	1,858.85	47,733.44	49,592.29	150,007.64
Jan. 1 to June 30, 1918	48,791.49	860.53	24,530.70	25,391.23	74,182.72
Balance plant and clearing, June 30, 1918	20,965.41				20,965.41
Total to June 30, 1918	2,941,132.22	31,921.30	285,026.01	316,947.31	3,258,079.53

Statement of cost by fiscal years, Klamath project.

Year ending June 30—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1905	$34,559.30				$34,559.30
1906	172,254.23				172,254.23
1907	827,030.70		$2,872.06	$2,872.06	829,902.76
1908	302,201.46		15,894.95	15,894.95	318,096.41
1909	319,322.32		23,560.28	23,560.28	342,882.60
1910	195,619.44		21,534.13	21,534.13	217,153.57
1911	119,572.90		22,666.33	22,666.33	142,239.23
1912	221,744.70		14,698.43	14,698.43	236,443.13
1913	140,084.42		18,129.37	18,129.37	158,213.79
1914	113,848.66	$3,777.64	21,583.81	25,361.45	139,210.11
1915	156,238.10	8,525.95	41,991.04	50,516.99	206,755.09
1916	106,912.43	12,529.76	19,274.85	31,804.61	138,717.04
1917	108,457.37	5,513.83	29,579.92	35,093.75	143,551.12
1918	93,919.58	1,574.12	53,240.84	54,814.96	148,734.54
Balance in plant and clearing accounts June 30, 1917	29,366.61				29,366.61
Total to June 30, 1918	2,941,132.22	31,921.30	285,026.01	316,947.31	3,258,079.53

Estimated cost of contemplated work, Klamath project, during fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys:		
Trial lines	$5,000	
Soil surveys	1,000	
Test borings, etc	2,000	
Hydrometry	800	
Superintendence and accounts	800	
General expense	400	$10,000
Canal system:		
C canal, $24,000—		
Excavation, class 1, dry, 57,500 cubic yards	12,650	
Excavation, class 2, dry, 5,700 cubic yards	3,420	
Turnout, reinforced concrete, 100 cubic yards	2,300	
Gates and appliances	1,100	
Superintendence and accounts	1,230	
Engineering and inspection	1,600	
General expense	1,700	
South Branch or C-G Cut-off canal, $50,000—		
Excavation, class 1, dry, 50,000 cubic yards	12,500	
Structures, reinforced concrete, head works, 150 cubic yards; crossing diversion canal, 280 cubic yards; flume outlet, 70 cubic yards; drops, 110 cubic yards; drop and chute into Lost River, 100 cubic yards; total, 710 cubic yards	16,000	
Metal flume, 530 linear feet	12,000	
Gates and appliances	3,500	
Superintendence and accounts	1,500	
Engineering and inspection	2,500	
General expense	2,000	
G canal enlargement, $49,000—		
Excavation class 1, dry, 120,000 cubic yards	30.000	
Excavation, class 2, dry, 15,000 cubic yards	9,000	
Raising and extending bridges	2,000	
Extending turnouts	1,000	
Enlarging concrete drop, 40 cubic yards	1,000	
Superintendence and accounts	1,400	
Engineering and inspection	3,000	
General expense	2,000	123,400
Lateral system:		
Proposed fourth unit, Tule Lake marginal lands—		
Excavation, class 1, dry, 45,000 cubic yards	10,000	
Bridges, 30 M b. m	1,500	
Turnouts and measuring devices, 30 M b. m	1,800	
Other minor structures, 30 M. b. m	1,800	
Superintendence and accounts	600	
Engineering and inspection	1,800	
General expense	1,000	18,500

Estimated cost of contemplated work, Klamath project, during fiscal year 1919.—Contd.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Drainage system:		
Open drains, $99,000—		
Excavation, class 1, dry, 420,000 cubic yards	$80,000	
Bridges, 60 M. b. m	3,000	
Other minor structures, 40 M. b. m	2,400	
Superintendence and accounts	3,200	
Engineering and inspection	6,000	
General expense	4,400	
Closed drains, $14,000—		
Excavation, class 1, dry, 12,000 linear feet	4,800	
Back filling	800	
Pipe and laying	4,800	
Minor structures, timber, 15 M. b. m.	900	
Superintendence and accounts	700	
Engineering and inspection	1,200	
General expense	800	
		$113,000
Irrigable lands: Farm units, proposed fourth unit, Tule Lake marginal lands		1,500
Telephone system: Extending telephone lines for proposed fourth unit		300
Operation and maintenance during construction:		
Guards, Clear Lake and Lost River Reservoirs	1,300	
Lost River diversion canal	1,200	
Superintendence and accounts	300	
General expense	200	
		3,000
Operation and maintenance under public notice:		
First unit—		
Carriage, operation	3,000	
Carriage, maintenance	9,000	
Distribution, operation	5,000	
Distribution, maintenance	11,000	
Second unit—		
Carriage, operation	1,000	
Carriage, maintenance	1,500	
Distribution, operation	1,200	
Distribution, maintenance	3,600	
Third unit—		
Carriage, operation	800	
Carriage maintenance	1,200	
Distribution, operation	1,200	
Distribution, maintenance	3,100	
Auxiliary units—		
Carriage, operation	800	
Carriage, maintenance	1,200	
Distribution, operation	1,400	
Distribution, maintenance	2,500	
Drainage system—		
Open drains, operation	200	
Open drains, maintenance	1,300	
Closed drains, operation	300	
Closed drains, maintenance	1,700	
Hydrometry, operation	2,500	
Hydrometry, maintenance	500	
Guarding structures, operation	3,000	
		57,000
Stores and other operations:		
Hospital—		
Medical and surgical supplies	50	
Services of physicians	100	
Miscellaneous expense	50	
Mess-house operations, contract payments	800	
		1,000
Plant accounts:		
Construction plant and equipment, small drag-line excavator	7,500	
Two Ford automobiles	1,200	
Miscellaneous equipment	2,000	
		10,700
Total		338,400

Operating costs and revenues, Klamath project, to June 30, 1918.

EXPENSES.

Feature.	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Canal system: First, second, and third units	$13,039.09	$15,860.11	$28,899.20	$43,495.82	$57,286.46	$100,782.28
Lateral system: First, second, and third units	6,815.27	16,698.49	23,513.76	46,793.15	127,037.94	173,831.09
Drainage system: First unit, open drains	....	1,109.51	1,109.51	....	1,171.59	1,171.59
Flood protection: First unit	....	....	....	....	10,792.63	10,792.63
Total	19,854.36	33,668.11	53,522.47	90,288.97	196,288.62	286,577.59
Less accrued and unpaid operation and maintenance charges transferred to and added to construction charges	....	....	[1] 281.63	....	....	[1] 1,551.58
			53,240.84			285,026.01

[1] Deduct.

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$41,916.36	$219,055.15
Operation and maintenance charges paid in advance by water-right applicants.	[1] 106.61	293.42
Operation and maintenance charges paid and forfeited by water-right applicants	....	3.75
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	360.10	811.89
Rental of land and buildings during operating period	631.60	997.60
Rentals of irrigation water	1,571.35	5,398.11
Other revenues unclassified, earned during operating period	....	38.71
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants	[1] 886.86	[1] 2,872.62
Total	43,485.94	223,726.01
Difference (deficit)	9,754.90	61,300.00

[1] Deduct.

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

B. E. HAYDEN, project manager, Newell, S. Dak.

LOCATION.

Counties: Butte and Meade.

Townships: 6 to 10 N., Rs. 3 to 8 E., Black Hills meridian.

Railroads: Chicago & North Western; Chicago, Burlington & Quincy: Chicago, Milwaukee & St. Paul.

Railroad stations and estimated population June 30, 1918: Belle Fourche, 1,150; Newell, 370; Nisland, 150; Fruitdale, 100; Vale, 75.

WATER SUPPLY.

Source of water supply: Belle Fourche River.

Area of drainage basin: 4,265 square miles.

Annual run-off in acre-feet: Belle Fourche River at diversion dam (4,265 square miles), 1903 to 1917—maximum, 554,600; minimum, 119,800; mean, 312,400.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1918: 82,616 acres.

Area under water-right applications, season of 1918: 70,131 acres.

Length of irrigation season: May 1 to October 1—152 days.

Average elevation of irrigable area: 2,800 feet above sea level.

Rainfall on irrigable area: 10 years, average, 14.56 inches; 1917, 9.97 inches.

Range of temperature on irrigable area: —38° to 103° F.

Character of soil of irrigable area: North side of Belle Fourche River principally heavy clay soil, with scattered areas of sandy clay loam; south side, sandy loam. All of the soils are heavy enough not to be disturbed by winds.

Principal products: Grain, corn, alfalfa, potatoes, garden truck, and sugar beets.

Principal markets: Omaha, Nebr.; Chicago, Ill.; and mining towns in the Black Hills.

LANDS OPENED FOR IRRIGATION.

Dates of public notices, regulations, and orders relating thereto: June 21, 1907; May 29, 1908; January 18, 1909; February 19 and November 26, 1910: January 24, March 9, May 4, and December 30, 1911; February 3 and May 2, 1912; February 26, June 23, and July 21, 1913; January 19, February 26, May 29, August 14, and September 24, 1914; April 10 and May 18, 1915; March 10, March 16, and July 6, 1916; January 9, February 10, and October 4, 1917; April 10, 1918.

Location: Tps. 7 to 10 N., Rs. 2 to 7 E.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Duty of water: 1.5 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $30, $35, $40, and $45.

Annual operation and maintenance charge: For 1917, $1 per acre for first acre-foot of water, whether delivered or not, and 50 cents per acre-foot for additional quantities. For 1918, $1 per acre-foot for water used in July and August, and 50 cents per acre-foot for all other water used, with a minimum rate of $1.25 per acre.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers April 29, 1904.

Construction authorized by Secretary May 10, 1904.

Diversion dam and inlet canal completed September, 1907.

Belle Fourche Dam completed June, 1911.

First irrigation, season of 1908.

Entire project 94 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Belle Fourche project provides for the diversion of water from the Belle Fourche River by means of a dam about 1½ miles below Belle Fourche, S. Dak., and an inlet or supply canal about 6½ miles in length into a storage reservoir controlled by the Belle Fourche Dam on Owl Creek, a tributary of the Belle Fourche River; the distribution of water from the inlet canal to a small area of land and the distribution of water from the reservoir through two canal systems to lands on both sides of the Belle Fourche River.

The United States claims all waste, seepage, unappropriated spring, and percolating waters arising within the project, and proposes to use such water in connection therewith.

The features of the above irrigation plan completed are the diversion dam, headworks, inlet canal, Belle Fourche storage dam, south canal and laterals, north canal and all tributary laterals and structures. The features not yet constructed are Willow Creek and Nine Mile laterals and their tributaries, covering approximately 15,000 acres of land.

SUMMARY OF GENERAL DATA FOR BELLE FOURCHE PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:			
Irrigable acreage when project is complete			97,916
Public land entered to end of ficsal year		35,880	
Public land open to entry at end of fiscal year		2,007	
Public land withdrawn at end of fiscal year		15,300	
State land		4,520	
Private land		40,209	
Acreage service could have supplied season of 1917			82,616
Estimated acreage service can supply July 1, 1919			82,616
Acreage actually irrigated, season of 1917			50,272
Acreage cropped under irrigation, season of 1917			50,026
Crops:			
Value of irrigated crops, season of 1917			$1,171,239.00
Value of irrigated crops, per acre cropped			$23.50
Finances:			
Net construction cost to end of fiscal year			$3,455,238,73
Per cent complete at end of fiscal year			94
Appropriated for fiscal year 1919, total			$262,000.00
Allotment for construction, fiscal year 1919			$2,000.00
Estimated per cent complete, June 30, 1919			94
Estimated gross construction expenditures to June 30, 1920			$3,473,000.00
Estimated per cent complete, June 30, 1920			94
Announced construction charges per acre			$30, $35, $40, and $45
Appropriation, fiscal year 1918		$274,000.00	$274,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$67,490.58		
Transfers	4,744.80		
		$72,235.38	
Registered liabilities chargeable to 1918 appropriation		9,720.41	
Estimated engineering expenses on contract work wholly covered by 1918 appropriation			81,955.79
Unencumbered balance July 1, 1918			192,044.21

Repayments:	
Value of construction water-right contracts	$2,269,795.09
Construction charges—	
Accrued to end of fiscal year	266,833.14
Collected to end of fiscal year	251,969.17
Uncollected at end of fiscal year	14,863.97
Operation and maintenance charges (public notice)—	
Accured to end of fiscal year	278,740.34
Collected to end of fiscal year	237,854.59
Uncollected at end of fiscal year	40,885.75
Water-rental charges—	
Accrued to end of fiscal year	2,624.69
Collected to end of fiscal year	2,474.69
Uncollected at end of fiscal year	150.00
Drainage—estimated acreage damaged by seepage to end of fiscal year.	**2,668**

CONSTRUCTION DURING FISCAL YEAR.

No regular construction work was in progress during the fiscal year. Hydrometric investigations along the south canal were carried on to determine the amount of enlargement necessary to secure adequate capacity in that canal for supplying 100 second-feet for the proposed Nine Mile extension; preliminary investigations to determine the possibility of securing storage for the inlet canal and Johnson lateral lands were made; and 13 minor structures were installed to complete water deliveries to lands in old units of the project. The total cost of this work amounted to $536 and was charged to construction features.

SEEPAGE AND DRAINAGE.

The seeped area of the project did not increase materially during the year. A total of 2,668 acres has been temporarily relieved of charges on account of alkali and water logging.

The question of drainage under supplemental construction was put to a vote on May 21, with July 1, 1918, set as the limiting date for the return of contracts. At the close of business on June 30, 132 votes out of a possible 411 had been received, 26 of which were for and 106 against drainage. This action of the water users indicates that no drainage work will soon be taken up on the project.

OPERATION AND MAINTENANCE.

The water supply for the season of 1917 was more than adequate for all lands tributary to the Belle Fourche Reservoir, but for lands dependent on the direct flow of the Belle Fourche River the supply during July and August was very short, thus reducing materially the crop returns in that section of the project. The total flow of the Belle Fourche River was 238,589 acre-feet. Storage at the beginning of the season was 149,200 acre-feet and at the close was 69,000 acre-feet.

The number of farms furnished with water during the season was 825, comprising an irrigable area of 67,826 acres; of this area 50,026 acres were cropped and 50,272 acres were irrigated; 61,194 acre-feet of water were delivered to farms. The duty of water for the season was 1.31 acre-feet. Delivery of water to lands under the south canal was interrupted for a period of 10 days beginning with July 14 and again in August for a period of 4 days, due to breaks in the main canal. The first break occurred at a time when the irrigation demand was greatest and resulted in considerable damage to crops.

The water supply for the season of 1918 is most promising both under the reservoir and under direct flow. The available storage at the beginning of the season was 169,500 acre-feet.

By June 20 the flow in the Belle Fourche River had decreased to such an extent that rotation of delivery was being considered for nonstorage lands, but a considerable rise in the river at that time and general rains later practically assure an ample flow for the rest of the season.

The maintenance of canals and structures during the year did not include any unusual work, except in the repair of breaks in the south canal on July 14 and August 7. In the first instance it was necessary to discontinue the delivery of water to lands below the break for a period of 10 days. All available Government stock was immediately set to work and a call sent out to farmers affected for help in making the repair. From 70 to 90 head of stock were used working in two shifts and a new canal was excavated in the hillside over a length of about 550 feet. About 7,560 cubic yards of earth were moved. The second break was not so disastrous and was repaired by Government forces in about five days. The total cost of repairing both breaks was $13,436.80.

Other maintenance work done during the year consisted of cleaning and strengthening canals and laterals and in repairing and replacing small wooden structures. The concrete floor in the reservoir wasteway as it passes under the north canal was replaced, making the third floor that has been placed at that point. The action of alkaline seepage water from the canal has a marked effect on the concrete along this section of the wasteway.

The principal results accomplished with maintenance forces were: Repair to 157 wooden, 9 concrete, 5 steel, and 4 tile structures; structures built, 145 wood, 6 concrete, and 1 steel; 2,898 square yards of riprap placed; 310 miles of canals burned out; 31 miles of canals trimmed with scythes; 51 miles cleaned of silt and repaired; and 6 miles of banks raised, comprising in all the moving of about 31,317 cubic yards of earth. Material used was as follows: Cubic yards of concrete, 170; cubic yards of rock, 8; linear feet of 15 and 18 inch pipe, 75; linear feet wood drains, 335; miles of telephone line, 3.5; and 97,400 feet b. m. of lumber.

Historical review, Belle Fourche project.

Item.	1913	1914	1915	1916	1917	1918[1]
Acreage for which Service was prepared to supply water	65,852	68,852	78,591	78,591	83,335	82,616
Acreage irrigated	32,881	37,454	44,067	48,468	50,272	55,000
Miles of canal operated	462	498	528	529	625	675
Water diverted (acre-feet)	124,275	145,284	135,804	58,395	171,749	....
Water delivered to canal (acre-feet)	47,349	54,262	16,484	39,133	113,314	....
Per acre of land irrigated (acre-feet)	1.44	1.45	0.37	0.81	1.21	....

[1] To June 30, 1918, estimated.

SETTLEMENT AND DEVELOPMENT.

No new units were opened to settlement during the year, but the development of units already opened was satisfactory and the results gratifying. Sixty-five new filings were made, and there remain only 31 unentered farm units on the project.

The commissioner of State school and public lands held two auction sales of school lands within the project, one on July 31, 1917, and one on April 1, 1918, at which 2,080 acres of irrigable land were sold. Water-right applications have already been filed for 1,520 acres of this land.

A large area of native sod was broken and planted to crop during the year notwithstanding the heavy draft made on the young homesteaders to serve at the front.

Settlement data, Belle Fourche project.

Item.	1915	1916	1917	1918[1]
Total number of farms on project	1,292	1,292	1,292	1,292
Population	2,375	2,375	2,400	2,400
Number of irrigated farms	717	802	825	825
Operated by owners or manager	462	495	553	550
Operated by tenants	255	249	260	275
Population	1,877	2,067	2,150	2,427
Number of towns	5	5	5	5
Population	2,050	1,775	1,845	1,775
Total population in towns and on farms	4,425	4,150	4,245	4,175
Number of public schools	23	23	23	23
Number of churches	11	11	11	11
Number of banks	9	9	9	9
Total capital stock	$140,000	$140,000	$140,000	$140,000
Amount of deposits	$1,145,731	$1,756,211	$2,457,000	....
Number of depositors	3,728	4,228	....	....

[1] To June 30, 1918, estimated.

PRINCIPAL CROPS.

The 1917 crop returns showed a total valuation of $1,171,239 and a per acre value of $23.50. These figures represent an increase over 1916 of approximately 100 per cent.

Hogs during the year decreased in numbers about 20 per cent while their increase in value was nearly 43 per cent; sheep increased about 13½ per cent in numbers and 254 per cent in total value; beef cattle decreased 19 per cent in numbers and 4 per cent in total value; dairy cattle just about held their own in number with an increase in total value of about 8 per cent.

The high price received by farmers for farm products including all classes of livestock together with generally satisfactory crop returns resulted in a greater degree of general prosperity than has heretofore existed on the project since its inception. Prospects on June 30 for satisfactory crops and prices are even brighter than at the same time last year.

Crop report, Belle Fourche project, South Dakota, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	19,702	Ton	35,692	1.81	$15.00	$535,380	$27.20
Alfalfa seed	942	Bushel	2,335	2.5	8.00	18,680	19.80
Barley	2,286	...do	55,164	24.2	1.25	68,955	30.00
Beans	217	...do	1,155	5.3	6.00	6,930	31.90
Beets, sugar	1,771	Ton	10,502	5.9	6.50	68,263	38.35
Corn	2,902	Bushel	46,290	15.9	2.00	92,580	31.90
Corn fodder	1,166	Ton	1,918	1.6	8.00	15,344	13.20
Flax	870	Bushel	2,129	2.4	2.25	4,790	5.50
Garden	161					11,906	74.30
Hay	4,475	Ton	3,108	.7	16.00	49,728	11.10
Oats	4,955	Bushel	106,309	21.5	.70	74,416	15.00
Pasture, alfalfa	1,700					34,709	20.20
Pasture, other	4,400					32,000	7.28
Potatoes	285	Bushel	27,310	95.7	.90	24,579	86.40
Rye	76	...do	1,500	19.8	1.70	2,550	33.50
Wheat	5,122	...do	67,095	13.1	1.90	127,480	24.80
Miscellaneous	169					2,949	17.45
Total	51,199						
Less duplicated areas	1,173						
Total cropped acreage	50,026	Total and average				1,171,239	23.50

		Areas.	Acres.	Farms.	Per cent of project.[1]
Irrigated, no crop:		Total irrigable area farms reported	67,826	825	69.4
Orchard	14	Total irrigated area farms reported	50,272	825	51.4
Young alfalfa with nurse crop	2,043	Under water-right applications	50,272	825	51.4
Young alfalfa without nurse crop	232	Total cropped area farm reported	50,026	825	51.1
Less duplicated areas	2,043				
Total irrigated acreage	50,272				

[1] Based on 97,916 acres.

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, OCTOBER 4, 1917.

1. **Repairs on Belle Fourche Reservoir.**—Under the provisions of the reclamation act of June 17, 1902 (32 Stat., 338), and acts amendatory thereof, and supplementary thereto, necessary repairs to the concrete paving on the face of the Belle Fourche Reservoir, Belle Fourche project, South Dakota, have been made at a cost of $35,146.41, or 50 cents per irrigable acre, which latter amount is chargeable against each acre of irrigable land, under the project, except lands of the fifth unit subject to a construction charge of $45 per irrigable acre, under public notice of January 9, 1917.

2. **Payment of cost.**—The said charge of 50 cents per irrigable acre shall be paid as an operation and maintenance charge, additional to any heretofore announced. As to those lands affected and now under public notice, one-half of the charge shall be due and payable on March 1, 1919, and one-half on March 1, 1920; as to all other lands affected, the charge shall be added equally to the first and second annual operation and maintenance charges to be hereafter announced by public notice: *Provided, however,* That any person in interest may, at his option, pay the said charge as one additional installment of his

construction charge at the end of the 20-year period, by executing and filing with the project manager on or before December 1, 1917, an approved agreement to that effect.

ALEXANDER T. VOGELSANG,
Acting Secretary of the Interior.

PUBLIC NOTICE, APRIL 10, 1918.

1. **Annual operation and maintenance charges.**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is made as follows: The minimum annual operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice, against all lands of the Belle Fourche project, South Dakota, under public notice, shall be $1.25 per irrigable acre whether water is used thereon or not. During the months of July and August water will be furnished for $1 per acre-foot, and during the balance of the irrigation season for 50 cents per acre-foot. Payments under the minimum charge will be credited on the account for water received under the above acre-foot rates. All operation and maintenance charges under the project will be payable on March 1 of each year for the preceding irrigation season, but where water-right application is made after June 15, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

2. **Repairs on Belle Fourche Reservoir.**—The operation and maintenance charges to cover repairs on Belle Fourche Reservoir announced in paragraph 2 of public notice dated October 4, 1917, are additional to the operation and maintenance charges announced in paragraph 1 of this notice.

E. C. BRADLEY,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Belle Fourche project, June 30, 1918.

Cash			$4,468.47
Inventory of stock on hand			20,327.36
Accounts receivable			2,058,881.67
Construction cost		$3,470,868.42	
Less construction revenue earnings	$12,894.40		
Less cost adjustments	2,735.29		
		15,629.69	
			3,455,238.73
Operation and maintenance cost		480,622.96	
Less operation and maintenance revenue earnings	3,476.35		
Less cost adjustments	251.52		
		3,727.87	476,895.09
Total			6,015,811.32
Accounts payable			17,919.49
Contingent obligations			4,468.47
Reserves for repayment to reclamation fund of cost of project			2,558,475.53
Net revenue from sale of town-site lots			61,486.39
Capital investment:			
Disbursement, transfer, and joint construction vouchers received		4,017,478.69	
Collection, transfer, refund, and joint construction vouchers issued		644,017.25	
Net investment			3,373,461.44
Total			6,015,811.32

Feature costs of Belle Fourche project to June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys		$806.09
Storage works:		
Diversion dam		117,322.76
Feed canal		333,181.36
Belle Fourche dam	$872.05	1,236,049.37
Supplemental construction in Belle Fourche dam		33,187.93
	872.05	1,719,741.42
Canal system:		
North canal	[1] 5,353.66	500,521.56
South canal	[1] 2,704.33	488,642.17
	[1] 8,057.99	989,163.73
Lateral system:		
Laterals, division A	137.24	252,682.45
Laterals, division B		129,230.17
Laterals, division C		67,710.43
Laterals, division D		133,864.19
South canal extension		36,699.44
Completing unfinished deliveries	1,240.70	1,240.70
Willow Creek lateral investigations		789.56
Johnson lateral storage investigations	302.35	302.35
Nine Mile Creek investigations	954.24	5,204.87
Total	2,634.53	627,724.16
Drainage system	264.32	3,344.27
Farm units: Surveys		6,246.64
Permanent improvements:		
Buildings	[1] 1,160.00	37,253.79
Real estate		54,107.10
Total		91,360.89
Telephone system		14,583.67
Balance in plant accounts	[1] 15,909.53	
Operation and maintenance charges transferred to and compounded with construction charges	2,477.32	17,897.55
Gross cost to June 30, 1918	[1] 18,879.30	3,470,868.42
Less revenues earned during construction period:		
Rental of buildings		5,492.40
Rental of grazing and farming lands		2,777.70
Rentals of irrigation water		910.00
Rentals of telephones and tolls		87.48
Contractors' freight refunds		2,880.32
Other revenues, unclassified		746.50
Profit on hospital operations		2,735.29
		15,629.69
Net cost of construction of project to June 30, 1918		3,455,238.73

[1] Deduct.

Statement of cost by calendar years, Belle Fourche project.

Year ending Dec. 31—	Construction.	Operation and maintenance under public notice.	Total cost.
1909	$2,275,751.06		$2,275,751.06
1910	372,235.93		372,235.93
1911	438,213.28	$96,682.90	534,896.18
1912	61,906.76	58,911.39	120,818.15
1913	32,935.37	55,737.46	88,672.83
1914	107,097.36	60,060.62	167,157.98
1915	69,874.22	47,542.16	117,416.38
1916	78,098.73	42,106.36	120,205.09
Supplemental construction	30,787.31		30,787.31
1917	[1] 1,378.38	71,992.36	70,613.98
Supplemental construction	2,400.62		2,400.62
June 30, 1918	2,946.16	34,393.91	37,340.07
Total	3,470,868.42	467,427.16	3,938,295.58
Plant		13,195.80	13,195.80
Grand total	3,470,868.42	480,622.96	3,951,491.38

[1] Deduct.

Statement of cost by fiscal years, Belle Fourche project.

Year ending June 30—	Construction.	Operation and maintenance under public notice.	Total cost.
1910	$2,422,853.38		$2,422,853.38
1911	467,295.63		467,295.63
1912	254,448.01	$123,399.85	377,847.86
1913	[1] 2,104.72	60,392.66	58,287.94
1914	73,888.75	52,594.44	126,483.19
1915	109,944.28	55,748.66	165,692.94
1916	79,919.10	40,943.59	120,862.69
1917	34,405.83	53,901.66	88,307.49
Supplemental construction	32,530.86		32,530.86
1918	[1] 2,969.77	80,446.30	77,476.53
Supplemental construction	657.07		657.07
Total	3,470,868.42	467,427.16	3,938,295.58
Plant		13,195.80	13,195.80
Grand total	3,470,868.42	480,622.96	3,951,491.38

[1] Deduct.

Estimated cost of contemplated work, Belle Fourche project, during fiscal year 1918.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Storage works, storage for Johnson lateral:		
Chicken Creek Reservoir investigations	$2,000	$72,000
Contract payments	70,000	
Lateral system:		
Nine Mile Creek investigations	1,000	
Unfinished deliveries	2,500	3,500
Drainage system: Surveys	1,000	1,000
Operation and maintenance under public notice:		
Operation	38,400	80,000
Maintenance	41,600	
Total	156,500	156,500

Operating costs and revenues, Belle Fourche project, to June 30, 1918.

EXPENSES.

Item.	Fiscal year 1918.			To end fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works				$18,848.37	$52,270.38	$71,118.75
Diversion dam and inlet canal	$1,985.67	$934.05	$2,919.72			
Storage dam and reservoir	1,452.72	773.62	2,226.34			
Canal system				29,839.83	104,000.18	133,840.01
North canal system	1,643.49	10,031.37	11,674.86			
South canal system	2,198.08	15,651.21	17,849.29			
Lateral system				56,832.02	209,335.06	266,167.08
North canal lateral system	7,971.11	20,597.86	28,568.97			
South canal lateral system	2,288.67	10,252.95	12,541.62			
Johnson lateral system	809.98	3,341.95	4,151.93			
Drainage system					3,624.44	3,624.44
Maintenance of permanent improvements		5,373.38	5,373.38		9,894.46	9,894.46
Water right adjudication investigations		853.57	853.57		853.57	853.57
Undistributed expenses					[1] 3,236.06	[1] 3,236.06
Corral operations		[1] 2,356.07	[1] 2,356.07			
Motor vehicle operations		[1] 48.05	[1] 48.05			
Superintendence		[1] 1,114.47	[1] 1,114.47			
Shop operations		23.04	23.04			
General expense		259.49	259.49			
Supplemental construction, chargeable to operation and maintenance:						
Cost to Aug. 31, 1914					2,735.60	2,735.60
Cost since Sept. 1, 1914					326.86	326.86
Plant accounts		11,039.11	11,039.11		13,195.80	13,195.80
Subtotal	18,349.72	75,613.01	93,962.73	105,520.22	393,000.29	498,520.51
Less unpaid operations and maintenance accruals transferred to and added to construction charges		[1] 2,477.32	[1] 2,477.32		[1] 17,897.55	[1] 17,897.55
Net total	18,349.72	73,135.69	91,485.41	105,520.22	375,102.74	480,622.96

[1] Deduct.

REVENUES.

Items.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$278,740.34
Operation and maintenance charges paid in advance by water-right applicants	4.50
Operation and maintenance charges paid and forfeited by water-right applicants	508.65
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	4,539.04
Rental of land and buildings during operating period	1,622.81
Rentals of irrigation water	1,714.69
Other revenues, unclassified, earned during operating period	138.85
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants	[1] 3,547.07
Total	283,721.81
Difference (deficit)	196,901.15

[1] Deduct.

UTAH, STRAWBERRY VALLEY PROJECT.

J. L. LYTEL, project manager, Provo, Utah.

LOCATION.

Counties: Utah and Wasatch.

Townships: 9, 8, and 10 S., Rs. 1 to 3 E., Salt Lake base and meridian.

Railroads: Denver & Rio Grande; Salt Lake Route.

Railroad stations and estimated population, June 30, 1918: Payson, 3,000; Spanish Fork, 3,600; Springville, 3,700.

WATER SUPPLY.

Source of water supply: Strawberry and Spanish Fork Rivers and a number of small streams and springs not on the watersheds of these two. Contemplated pumping plants.

Area of drainage basins: Strawberry River, including Indian and Trail Hollow Creeks, 175 square miles; Spanish Fork River, 670 square miles.

Annual run-off in acre-feet: Strawberry River, including Indian and Trail Hollow Creeks, 1903 to 1912, maximum 150,000; minimum 49,000; mean 77,500; 1913 to 1917 (net inflow), maximum 104,000; minimum 35,000; mean 74,000. Spanish Fork River at Spanish Fork, 1903–1917, maximum 227,000; minimum 65,000; mean 123,300.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water during the season of 1918: 50,000 acres; reservoir has in storage 232,000 acre-feet available for irrigation purposes.

Length of irrigating season: April 15 to September 30—169 days.

Average elevation of irrigable area: 4,600 feet above sea level.

Rainfall on irrigable area: At Provo, average 21 years, 14.5 inches; 1917, 14.29 inches. At Strawberry Reservoir, average 5 years, 19.66 inches; 1917, 12.57.

Range of temperature on irrigable acre: −10° to 95°; mean temperature at Provo, 49° F.

Character of soil on irrigable area: Sandy loam, heavy clay, and varying mixture of both; black alluvium; loam; and gravel. Much of the soil is underlaid by a coarse gravel, and the natural drainage is excellent.

Principal products: Alfalfa, hay, cereals, sugar beets, fruits, vegetables.

Principal markets: Salt Lake City, Utah, and adjacent towns and mining districts.

LANDS OPENED FOR IRRIGATION BY PUBLIC NOTICE.

	Acres.
Spanish Fork unit, Oct. 9, 1915, to May 9, 1916, May 21, 1917, Apr. 30, 1918	31,351.84
Lake Shore unit, Oct. 8, 1915, May 9, 1916, May 31, 1917, Apr. 30, 1918	5,862.97
High line unit, May 13, 1916, May 21, 1917, Apr. 30, 1918	21,534.84
Power canal unit, Jan. 14, 1918	60.00
Total	58,809.65

In addition, the service has contracted to sell to Clinton, Soldier Fork, and Diamond Fork units a total of 878.4 acre-feet of water per annum; also 3,600 acre-feet to the Mapleton Irrigation District, 2,400 to the Springville Irrigation District, 200 acre-feet to Payson City and 400 acre-feet to Spanish Fork City.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.
Construction recommended by board of engineers October 2, 1905.
Construction authorized by Secretary, December 15, 1905.
Excavation of tunnel completed June 20, 1912.
Storing of water in Strawberry Reservoir begun July 14, 1912.
Construction of Indian Creek Dike completed September, 1912.
Strawberry tunnel formally opened September 13, 1913.
Construction of Strawberry Dam completed September 20, 1913.
Construction started on high-line canal, January, 1915.

First storage water used for irrigation, June 27, 1915.

Divisions 1 to 9, distribution system, practically completed December 31, 1915.

High-line canal turned over to water users, April 24, 1916.

Mapleton and Springville irrigation districts formed August 20, 1917, and September 4, 1917, respectively.

Mapleton lateral started March 15, 1918.

Project as a whole 87.2 completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Strawberry Valley project provides for the storage of water in a reservoir on the Strawberry River; the discharge of the stored water through the Strawberry tunnel, approximately 3¾ miles long, into Diamond Fork, a tributary of the Spanish Fork River; and the diversion of water from the Spanish Fork River into canal systems, watering lands east and south of Utah Lake, in Utah County. A hydroelectric plant on the south side of the river supplies power for construction and commercial purposes. Part of the power developed may ultimately be used for pumping water for irrigation of high lands and drainage of low lands. The United States claims all waste, seepage, unappropriated spring, and percolating water arising within the project and purposes to use such water in connection therewith.

On the high line unit, where an area of 25,000 acres, the greater part of which at present has no water right, will be irrigated, a complete canal system will be constructed by the United States, and on the Spanish Fork and Lake Shore units, where a supplemental supply will be furnished for a large acreage, the existing canal systems will be used. Any necessary enlargements or extensions will be made by the water users comprising the various canal companies, for according to the terms of the contract between the United States and the canal companies, the responsibility of the United States ends with the delivery of the water at the heads of the various canals. In the case of the Soldier Fork, Diamond Fork, and Clinton districts, water belonging to appropriators below the confluence of Diamond Fork with the Spanish Fork River is used by persons above this point, and an equal amount of water is released from the Strawberry Reservoir for the benefit of the prior appropriators. The water users build all of the ditches and other irrigation structures themselves.

The completed features of the irrigation plan are: Diversion dam on the Spanish Fork River, power canal, the first unit of the hydroelectric power plant on the Spanish Fork River, Strawberry Dam, all of the canal system of the high line unit, including all canals and laterals irrigating Goshen Valley and the land between the west side of West Mountain and Utah Lake, and the following features in connection with the Strawberry Reservoir; Starwberry Dam, Indian Creek Dike, Indian Creek and Trail Hollow feeder canals and appurtenant structures, and the East Portal camp. In connection with the construction of these features 55 miles of wagon road, 44 miles of telephone lines, and 49½ miles of high tension transmission lines have been built. Power from the United States Reclamation Service power house is being supplied to the cities of Payson, Spanish Fork, Springville, and Salem for lighting and commercial purposes. The United States built the high-tension lines from its power house to these towns. The towns built their own substations, with the exception of Springville, and own their distributing system in all cases.

The United States at the present time is constructing Mapleton lateral, capacity 85 second-feet, a distance of 6¾ miles to irrigate approximately 10,000 acres of land in the vicinity of Mapleton and Springville. Two irrigation districts, covering these lands, have been formed under the State laws and contracts entered into between them and the United States for the purchase under the Warren Act of about 6,000 acre-feet of water. Option has been given the districts on an additional 2,400 acre-feet to be purchased within two years..

In accordance with present plans the work remaining to be done on the project consists of the construction of an extension of the high line canal into Goshen Valley for the purpose of irrigating some 10,000 to 12,000 acres of land near Goshen and Elberta; the drainage of 7,400 acres of land in Goshen Valley north of the town of Goshen and the drainage of 14,000 acres of land in what is known as the Payson Slough country north and east of Payson, in the vicinity of Salem, Benjamin, and Palmyra. All these plans are, however, tentative, and no work will be done, except the carrying on of the usual preliminary investigations, until the areas embraced in each are properly organized into irrigation or drainage districts under existing State laws, so that proper contracts may be made and United States investments protected.

No construction will be done on the Spanish Fork or Lake Shore units, as contracts with the canal companies on the units provide that the water from the project shall be delivered to the head of the several existing canals and the companies shall deliver it from these points to the lands.

SUMMARY OF GENERAL DATA FOR STRAWBERRY VALLEY PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:			
Irrigable acreage when project is complete			50.000
Public land entered to end of fiscal year		1,846	
Public land open to entry at end of fiscal year		54	
Private land		48,100	
Acreage service could have supplied season of 1917			38,500
Addition in fiscal year 1918			3,000
Estimated addition in fiscal year 1919			3,000
Estimated acreage service can supply July 1, 1919			44 500
Acreage actually irrigated, season of 1917			27,147
Acreage cropped under irrigation, season of 1917			25,620
Crops:			
Value of irrigated crops, season of 1917			$1,290,745.00
Value of irrigated crops, per acre cropped			$50.37
Finances:			
Net construction cost to end of fiscal year			$3,443,961.98
Per cent complete at end of fiscal year			87.2
Appropriated for fiscal year 1919, total			$59,000.00
Allotment for construction, fiscal year 1919			$36,000.00
Estimated per cent complete, June 30, 1919			90
Estimated gross construction cost to June 30, 1920			$3,505,000.00
Estimated per cent complete, June 30, 1920			90
Announced construction charges per acre			$80 and $90
Appropriation, fiscal year 1918			170,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$115,527.18		
Transfers	9,939.29		
		$125,466.47	
Registered liabilities chargeable to 1918 appropriation		36,011.33	
Contract obligations wholly covered by 1918 appropriation		1,500.00	
			162,977.80
Unencumbered balance, July 1, 1918			7,022.20
Repayments:			
Value of construction water-right contracts			2,341,244.91
Construction charges—			
Accrued to end of fiscal year			88,147.99
Collected to end of fiscal year			82,379.58
Uncollected at end of fiscal year			5,768.41
Operation and maintenance charges (public notice)—			
Accrued to end of fiscal year			39,085.57
Collected to end of fiscal year			38,057.09
Uncollected at end of fiscal year			1,028.48
Water-rental charges—			
Accrued to end of fiscal year			2,074.89
Collected to end of fiscal year			2,074.89
Power earnings—			
Accrued to end of fiscal year			56,268.15
Collected to end of fiscal year			54,570.30
Uncollected at end of fiscal year			1,697.85

CONSTRUCTION DURING FISCAL YEAR.

STORAGE WORKS.

Strawberry Dam.—The work of clay-blanketing the south end of the upstream face of the dam was continued during the first part of the fiscal year and completed in August, 1917. Approximately 2,000 cubic yards of material were placed and the seepage through the dam reduced to a very small amount.

Heber-Vernal road.—The sum of $1,000 was spent in conjunction with the State of Utah in repairing and reconstructing certain parts of the Heber-Vernal road where it passes across the north end of Strawberry Valley. These changes and repairs were made necessary because of the waters of Strawberry Reservoir inundating certain portions of the road. This road serves as one of the main arteries of transportation between Salt Lake City and the Uinta Reservation and its maintenance and upkeep are vitally necessary to that part of the State.

POWER SYSTEM.

Power canal.—Work started on the beam and slab covering over the power canal near tunnel No. 2 during November and was completed on December 10, 1917.

Approximately 102 feet of canal were covered, 105 cubic yards of concrete placed, and 125 cubic yards of excavation and back fill handled. The work of covering the power canal was first started in 1913 and has been carried on intermittently up to the present time. The work done this year completes the plans as originally contemplated and no more work on this feature is anticipated unless necessity requires.

Power plant.—During the first part of the fiscal year several new warehouses, storehouses, a garage, and wagon shed were built at the power plant to receive the equipment and supplies transferred from the Payson yard and Diamond Switch warehouses, both of which have been abandoned during the year.

Springville power transmission line.—In order to increase the load on the power plant and increase the revenues derived therefrom, a contract was entered into between Springville City and the United States Reclamation Service for furnishing the city with electrical power for lighting and commercial purposes. In consequence the United States erected 5.3 miles of high-tension power transmission line from its power plant at the mouth of Spanish Fork Canyon to the south boundary of the city limits of Springville and erected a substation there for transforming the current for commercial purposes.

LATERAL SYSTEM.

Mapleton lateral.—Construction work began on Mapleton lateral March 15, and from that time to the end of the fiscal year the construction of this feature progressed rapidly.

The completed features on the lateral are the reinforced concrete headworks, a reinforced concrete pipe line 625 feet long over the Spanish Fork River, a reinforced concrete siphon 125 feet long under the Denver & Rio Grande Railroad, a reinforced concrete culvert

30 feet long under the State road, approximately 90 per cent of the canal excavation, and several scattered miscellaneous concrete turnouts, bridges, cross flumes, and culverts.

The work as a whole was 75 per cent completed on June 30, and water should be delivered to the Mapleton irrigation district on or about July 10, 1918. Water to the Springville irrigation district is dependent upon the completion of Hobble Creek siphon, and delivery to that district will be somewhat later.

SURVEYS AND INVESTIGATIONS.

Location surveys.—Considerable field work was done during the fall of 1917 in locating the line for the extension of the high line canal into Goshen Valley. A line was run from station 1006+00, high line canal, to Currant Creek, and from Currant Creek to a point about one-half a mile northwest of the town of Elberta, a distance of 21.4 miles.

All necessary data were obtained to make a preliminary estimate of cost of the extension to Currant Creek. Beyond Currant Creek the work done was just sufficient to approximately locate the line.

All surveying and office work incident to the construction of Mapleton lateral and the new power line to Springville were done.

Miscellaneous surveys.—Throughout the year numerous farm-unit surveys were made of tracts desiring land classification, either prior to signing up or because of changes made necessary by seepage.

A special topographic survey was made of the John I. Hayes ranch at the confluence of Diamond Fork and Spanish Fork Rivers for the purpose of studying the inundated area and the present profile of stream beds and to furnish a basis for future studies in this locality.

Hydrographic investigations.—A special hydrographic investigation was carried on by the hydrographer during the months of June to October for the purpose of determining the coefficient *n* in Kutter's formula of the various types of waterways along the high line canal. From the information thus obtained it was thought that the capacity of the high line canal at maximum depth could be determined and some basis found for the determination of the probable reserve capacity existing in this canal and the amount of water available for use in the proposed extension of the canal into Goshen Valley. A report was made to the chief of construction under date of March 4, 1918.

Soil investigations.—The question of draining some of the seeped land in the vicinity of Goshen was taken up during the year with the Denver office and the drainage engineer. Under the direction of the drainage engineer, 54 soil samples were taken from different parts of the area and analyses made of their contents. The report of the drainage engineer under date of November 8, 1917, indicated that the soil was capable of growing crops after washing the land by flooding and proper drainage. No complete study of the question has been made, though preliminary examination fixed the cost at approximately $15 per acre. It is expected that a small amount of money will be expended during the next fiscal year to complete the work already done and to assist the drainage engineer in ascertaining the probable cost so that some formal proposition can be submitted to the landowners in that district.

Hydrometry.—The usual hydrometric investigations were carried on for the purpose of keeping to date the records of all the streams heretofore measured and that are connected with the water supply of the project. Twenty-one gauging stations were maintained and 315 miscellaneous current meter measurements made during the year.

One hydrographer and assistant kept careful record of the amount of water delivered during the season of 1917 to the various canal companies, at the same time maintaining the usual stations and making many miscellaneous measurements.

Farm units.—Many new water-right applications were received during the year and many transfers made.

A farm-unit plat of the power canal unit was made and sent to Washington for approval and printing.

Public notice covering this unit was issued by the Secretary of the Interior on January 14, 1918.

OPERATION AND MAINTENANCE.

Storage works.—The several completed features comprising the storage works were operated and maintained without unusual trouble. A small building was erected at Strawberry Dam to serve as shelter for the guards stationed there. During the year two guards had been stationed at Strawberry Dam as a war emergency. At the east portal were stationed one gate tender and assistant, who operated the gates controlling the flow of water through Strawberry Tunnel and had general supervision of the maintenance of all structures comprising the storage works.

Power canal.—The power canal was operated during the year without trouble. The Spanish Fork diversion dam and main distribution (power) canal were in charge of one gate tender and two guards during the irrigation season. At the Spanish Fork diversion dam a set of rack bars was installed to keep driftwood and débris from the power plant. The sluice gates at the diversion dam were repaired, and several leaks around the bottom of these gates were filled with concrete. Under one set of gates was placed a set of three sluicing pipes for the purpose of sluicing out all accumulating sand and silt in front of the intake to the power canal. It was thought that this scheme would, in a measure, assist to alleviate the silt trouble in the high-line canal. In order to further lessen the amount of silt flowing in the high-line canal, a 50-foot wooden weir was erected across the forebay at the power plant, only the top of the water being allowed to enter the high-line canal. As a result of these two measures the amount of silt entering the high-line canal up to July 1 has been greatly lessened and the operation of the canal made much easier.

A total of 27,150 acres were irrigated during the season of 1917. Of this total approximately 17,000 acres were under the high-line unit and 10,150 under the Spanish Fork and Lake Shore units. About 60,000 acre-feet were turned from the Strawberry Reservoir for irrigation purposes during the year, of which amount 14,000 acre-feet were rented or given by the Service, as a war measure, to lands under both units. On May 30, 1918, the reservoir had in storage approximately 232,000 acre-feet of water available for irrigation purposes.

Power system.—The power plant, power canal, and transmission lines were operated practically without interruption, and power was supplied under contract to Payson, Salem, Spanish Fork, Springville, and a few isolated places. The sale of power to the city of Springville was concluded during the year and delivery commenced on November 1, 1917, thereby adding to the load of the plant.

Wagon road.—Considerable expense has been encountered during the fiscal year in the operation and maintenance of Diamond Fork road between west portal flume and west portal. The erosive action of the tunnel water undermined the wagon road at several places and caused the road to slide into the stream bed. It was necessary in these cases to build the road completely and at certain points to riprap the sides of the stream to prevent a recurrence.

A small amount of work was done around the John I. Hayes ranch to keep the flow of tunnel waters from damaging his agricultural lands. Because of washing out and destroying the headworks and certain portions of his ditches it was necessary to construct a 51-foot wooden Howe truss to carry a metal flume across Diamond Fork River and rebuild his ditch in a different location.

Miscellaneous.—Two auction sales were held, one at Diamond Switch on November 5, 1917, and the other at the power plant on November 7, when all buildings and unneeded equipment were sold.

IRRIGATION DISTRICTS.

Mapleton and Springville districts.—These two irrigation districts were organized under the State laws during the fiscal year, and contracts between them and the United States for furnishing water under the Warren Act executed on January 2, 1918, and December 29, 1917, respectively.

The quantity of water contracted for by both districts is 6,000 acre-feet, of which amount Mapleton subscribed 3,600 acre-feet.

Two-year options have been approved for the purchase of 2,400 acre-feet additional by these districts, the amount asked for by the Springville district being 2,000 acre-feet.

Confirmatory proceedings have been instituted by both districts in the State district court of Utah County, and they have been duly adjudged legally organized and qualified to execute the contracts with the United States.

It has been found necessary to rent water to these districts during the irrigation season of 1918 on account of lateness in finishing the Mapleton lateral and the doubtful benefits to be derived by the use of the water on the dry lands where grain crops were practically matured before water could reach them.

Goshen irrigation district.—Some preliminary steps have been taken toward the formation of an irrigation district covering the dry lands south and west of Goshen. This land can be reached by an extension to the present high-line system, and though the cost of constructing the canal will be heavy it is thought that favorable action may result, as it is the only opportunity for obtaining water for these lands that is likely ever to be presented again. A report, covering the cost of this proposed extension, was made by the project manager to the chief of construction.

DRAINAGE DISTRICTS.

Goshen drainage district.—As already explained under soil investigations, some money has been expended on seeped lands north of the town of Goshen to determine the soil conditions and possible means of draining these lands and restoring them to beneficial use. However, the landowners have not shown any initiative toward the formation of a drainage district, and it is doubtful if any more funds will be expended until some interest is shown in the matter. A preliminary report on the cost and the feasibility of the proposed drainage system was made by the drainage engineer under date of November 8, 1917.

Payson Slough drainage district.—The question of draining about 14,000 acres of seeped land in the vicinity of Salem, Payson, and Benjamin has been discussed among the water users and landowners of these districts. No definite action has been taken and affairs are still in the incipient stage.

Before the end of the next fiscal year it is expected that some small investigations will have been made to ascertain the best possible way of draining, and its probable cost per acre. This will enable some definite proposal to be made and proper action can then be taken toward the formation of a drainage district under the State laws.

GRAZING LAND LEASES.

Strawberry Valley grazing lands.—The 60,160 acres of grazing land in Strawberry Valley, under lease to the Heber Horse & Cattle Growers' Association and the Wallsburg Live Stock Association, supported, on an average, during the season nearly 13,000 head of sheep, cattle, and horses.

West Mountain grazing land.—On January 18, 1918, 5,250 acres of land lying on and along the slopes of West Mountain in T. 8 S., R. 1 E., Salt Lake base and meridian, were leased to Olof G. Peterson and John L. Ellertson for $150 per year for 5 years. This land is used to lamb sheep on or for grazing sheep and cattle during the early spring. The feed is gone by summer and can not be used.

Goshen Valley grazing lands.—The contract, dated July 17, 1917, between certain Goshen individuals and the United States for the leasing of 5,600 acres of land for grazing purposes at $1,511 per year has been canceled for nonpayment of money and the land re-leased to C. F. Dixon for a period of one year for $325. Suit is likely to be instituted by the United States to recover the difference between the two contracts.

LEASE OF UNITED STATES RECLAMATION SERVICE POWER PLANT AT MOUTH OF SPANISH FORK CANYON.

The question of leasing the Government plant for a period of years to the Utah Power & Light Co. has been under consideration of the Washington and Denver offices for some time. A definite proposition for leasing the plant was made to the Government by this company. The Strawberry High Line Canal Co. and several towns using power from the United States Reclamation Service power plant under the project have submitted a proposal to the Government that will materially alter the revenues derived from this source and may result in the plant being operated by the Government for the benefit of the various project communities.

BOARD OF ENGINEERS.

A board of engineers, composed of Messrs. Wiley, Walter, and Lytel, convened at Provo, March 14, 1918, to pass upon certain claims submitted by the Strawberry high line canal and lateral system. A complete report on the subject was submitted to the chief of construction under date of March 16, 1918.

SETTLEMENT.

There exists on the project to-day practically no Government land susceptible of irrigation under existing units. The Government land opened for entry on June 20, 1917, has been all entered, except for a few small isolated tracts. Most of this land is already under cultivation and the remainder is being prepared for fall plowing. The weather has been ideal for crop raising, except for a few local cloudbursts, which did some damage to hay and grain.

The prospect for an abundant crop of fruit, hay, grain, and sugar beets is excellent, and this year should see the farmers obtaining the best of prices for everything.

A new sugar-beet factory is being erected near Springville and should be finished in time to handle the 1918 crop of sugar beets in that immediate vicinity.

Crop report, Strawberry Valley project, Utah, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	7,162	Tons	22,588	3.16	$15.00	$338,820	$47.30
Apples	33	Bushels	1,822	55.2	.60	1,093	33.13
Barley	503	...do	24,311	48.3	1.50	36,466	72.49
Beans	172	...do	1,649	9.8	5.40	9,148	53.18
Beets, sugar	5,157	Tons	52,888	10.25	7.00	370,216	71.78
Cane	9	...do	34	3.79	10.00	340	37.77
Corn	382	Bushels	6,320	16.6	.96	6,067	15.88
Corn fodder	14	Tons	26	1.8	5.00	130	9.30
Garden	104					7,086	68.13
Hay, except above	233	Tons	418	1.8	10.00	4,180	17.94
Oats	2,180	Bushels	76,169	34.9	1.00	76,169	34.94
Orchard	140					9,755	69.77
Pasture	984					9,694	9.84
Potatoes	434	Bushels	51,286	118.3	.66	33,849	77.99
Rye	74	...do	334	4.5	1.80	601	8.12
Wheat	8,541	...do	203,753	23.85	1.90	387,131	45.32
Less duplicated areas	502						
Total cropped	25,620	Total and average				1,290,745	50.37

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop	788	Total irrigable area farms reported	28,181	1,187	98.7
Not reported	739	Total irrigated area farms reported	27,147	1,121	95.0
		Under water-right applications			
		Under rental contracts			
Total irrigated	27,147	Total cropped area farms reported	25,620	1,121	89.7

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, JANUARY 14, 1918.

1. **Lands for which water will be furnished.**—In pursuance of the provisions of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts both amendatory thereof and supplemental thereto, and particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), notice is hereby given that water is available from the Strawberry Valley project, Utah, for the irrigation season ending September 30, 1917, and for each irrigation season thereafter, in accordance with the terms of the form of water-right application for the power canal unit, approved by the Secretary of the Interior December 6, 1915, for lands in the power canal unit, described as follows, to wit:

"Beginning at a point 16 2/3 chains south of the northwest corner of section 34, township 8, south of range 3 east of the Salt Lake meridian; thence east 3.75 chains; thence south 16 degrees 50 minutes east, 24.37 chains more or less, to east and west quarter line of aforesaid section 34; thence west along said quarter line 26.50 chains; thence north 28 degrees 59 minutes west 11.35 chains; thence south 61 degrees 0.01 minute west, 5 chains more or less, to the east line of the property of the United States Reclamation Service; thence along said property line north 28 degrees 59 minutes west, 7.50 chains more or less, to the northeast corner of said property; thence north 64 degrees 40 minutes east, 23.30 chains; thence south 16 degrees 50 minutes east, 11 chains; thence north 64 degrees 40 minutes east, 5.50 chains to section line between sections 33 and 34; thence north along said section line, 7.50 chains more or less, to place of beginning, containing 60 acres more or less."

2. **Limit of area for which water right may be secured.**—The maximum limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

3. **Application for water right.**—All water-right applications must be made to the project manager, United States Reclamation Service, Provo, Utah, upon forms provided for that purpose, and may be made on and after the date hereof.

4. **Classes of charges for water rights.**—The water-right charges are of two kinds, to wit: (1) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge; and (2) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

5. **Construction charge.**—The construction charge shall be $80 per acre of irrigable land, payable as follows:

An initial payment of 5 per cent of the construction charge shall be made at the time of filing water-right application, and the remainder of the construction charge shall be due and payable in 15 annual installments, the first 5 of which shall each be 5 per cent and the remainder each 7 per cent of the total construction charge. The first of said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

6. **Increased construction charges in certain cases.**—In all cases where water-right application for lands in private ownership shall not be made within one year from the date of this notice, the construction charge for such lands shall be increased 5 per cent each year until such application is made and an initial installment is paid.

7. **Advance payment of construction charge permissible.**—Any water-right applicant may, at his option, pay in advance the whole or any part of the construction charge owing by him within any shorter period than that prescribed by this notice.

8. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1917, and thereafter until further notice, shall be $1.60 per acre of irrigable land, whether water is used thereon or not, which will entitle the water user to not more than 2 acre-feet of water per irrigable acre. These charges will be due and payable on December 1 of each year for the preceding irrigation season.

9. **Place and method of payment of water-right charges.**—All water-right charges must be paid at the office of the United States Reclamation Service, Provo, Utah, in cash, or by New York draft, or money order, payable to the special fiscal agent, United States Reclamation Service.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, APRIL 30, 1918.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement of the annual operation and maintenance charges in the irrigation season of 1918, and thereafter until further notice, for all lands of the Spanish Fork, Lake Shore, and high-line units of the Strawberry Valley project, Utah, under public notice, is hereby made as follows:

2. **Spanish Fork and Lake Shore units.**—The minimum annual operation and maintenance charge for the Spanish Fork and Lake Shore units shall be 50 cents per irrigable acre, whether water is used or not, which charge will entitle the water user to not more than 1 acre-foot of water per irrigable acre, and in no event to more than the amount per acre specified in the water-right application, and for all additional water a charge of 50 cents per acre-foot will be made: *Provided*, That no additional water will be furnished to any water user who has not made water-right application for at least 2 acre-feet of water per irrigable acre for all irrigable land owned by him.

3. **High-line unit.**—The minimum annual operation and maintenance charge for the high-line unit shall be $1 per irrigable acre, whether water is used or not, which charge will entitle the water user to not more than 2 acre-feet of water per irrigable acre, and for all additional water a charge of 50 cents per acre-foot will be made: *Provided*, That no additional water will be furnished to any water user who has not made water-right application for at least 2 acre-feet of water per irrigable acre for all irrigable land owned by him.

4. **Time of payment.**—All operation and maintenance charges will be due and payable on December 1 of each year for the preceding

irrigation season, except that all charges for water additional to the amount specified in the water-right application are payable in advance when the water is ordered. Where water-right application is made for public land entered under the reclamation law after June 15, or where water-right application is made for land in private ownership after August 1, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

E. C. Bradley,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Strawberry Valley project, June 30, 1918.

Cash			$4,144.13
Inventory of stock on hand			24,395.73
Accounts receivable			2,264,684.94
Construction work contracted			1,500.00
Construction cost		$3,469,871.92	
Less construction revenue earnings	$53,750.79		
Add cost adjustments	[1] 27,840.85		
		25,909.94	
			3,443,961.98
Operation and maintenance cost		71,569.69	
Less operation and maintenance revenue earnings		3,501.24	
			68,068.45
Total			5,806,755.23
Accounts payable			36,451.19
Contingent obligations			5,616.83
Reserves for repayment to reclamation fund of cost of project			2,379,405.00
Miscellaneous revenues			51,244.84
Capital investment:			
Disbursement, transfer, and joint construction vouchers received		$3,788,092.01	
Collection, transfer, refund, and joint construction vouchers issued		454,054.64	
Net investment			3,334,037.37
Total			5,806,755.23

Feature costs of Strawberry Valley project to June 30, 1918.

Features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys, project as a whole:		
Reconnaissance	$6.90	$5,428.19
Trial lines	951.12	1,067.89
Topography	1,555.14	11,575.74
Soil surveys	362.76	362.76
Water rights		12,184.82
Experimental investigations	78.14	1,617.94
Subdivisions		321.62
Cross sections		12.16
Location		6.05
Farm units	18.96	18.96
Triangulation	68.16	68.16
Level control	41.48	41.48
Hydrometry		15,684.29
	3,082.66	48,890.06
Storage system:		
Strawberry Dam	[1] 891.92	159,700.01
Wasteway at Strawberry Dam	[1] 542.48	56,476.65
Bridge over wasteway at Strawberry Dam	[1] 85.66	8,895.18
Sluicing tunnel at Strawberry Dam	[1] 456.83	47,432.25
Indian Creek Dike		119,249.92
Indian Creek and Trail Hollow diversion canals and bridges		70,764.66
Indian Creek and Trail Hollow intake spillway		21,845.95
Indian Creek and Trail Hollow terminal drop and chute		21,734.77
Strawberry Tunnel controlling works and intake	[1] 970.75	98,757.3

[1] Deduct.

Feature costs of Strawberry Valley project to June 30, 1918—Continued.

Features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Storage system—Continued.		
Strawberry Tunnel, proper	[1] $12,759.15	$1,063,590.81
Strawberry tunnel outlet weir	[1] 99.92	10,428.54
Measuring flume at west portal of Strawberry Tunnel	[1] 71.38	7,052.34
Permanent camp at east portal, Strawberry Tunnel	[1] 85.66	8,336.65
Submerged lands (storage reservoir)		10,000.00
Used equipment	[1] 19,029.61	
	[1] 34,993.36	1,704,265.09
Canal system:		
Main distribution and power canal—		
Spanish Fork Reservoir and River improvement		10,375.49
Spanish Fork diversion dam		39,695.90
Spanish Fork River bridge at diversion dam		2,524.60
Permanent camp at Spanish Fork diversion dam		6,812.71
Canal excavation		143,638.31
Canal concrete lining		42,659.60
Canal aqueduct		13,052.09
Culvert at station 139		2,584.20
Concrete arch and beam and slab covering	2,579.76	33,830.29
Tunnel No. 1, power canal		27,606.23
Tunnel No. 2, power canal		21,852.22
Minor structures, timber		8,263.33
Minor structures, concrete		1,634.76
Wasteway, sandbox, and inlet chamber		24,750.02
	2,579.76	379,279.75
High-line canal—		
Examination and surveys		38,835.41
Headworks		4,364.36
Canal excavation	[1] 133.75	148,342.34
Canal lining, concrete		108,465.67
Tunnel No. 1, high-line canal		8,824.12
Peteetneet siphon		7,915.83
Peteetneet inlet dam		1,955.66
State road bridge, concrete		2,069.93
Siphon under San Pedro, Los Angeles & Salt Lake R. R.		3,946.00
Notch drop and chute, Goshen Pass		561.80
Siphon under Denver & Rio Grande R. R. at Goshen Pass		1,824.70
Spillway at head of Lateral 33		1,510.60
Flume, 9-foot, concrete, near power house and Payson Hill		44,706.18
Flume, 8-foot, concrete, near Goshen Pass		5,361.51
Flume, double-barrel, covered, concrete		13,889.72
Turnouts with checks		3,778.34
Minor structures, concrete		4,794.22
Minor structures, timber		19,120.28
Turnout No. 9 and bridge No. 6		1,687.67
Turnout No. 30 and measuring device		4,137.73
Minor structures, pipe		4,992.58
Flume, wood, division 2, near Salem		1,334.30
Turnout No. 3 (division 1)		3,007.25
	[1] 133.75	435,426.20
Total canal system	2,446.01	814,705.95
Lateral systems:		
Divisions 5, 6, 7, 8, and 9—		
Examinations and surveys		37,262.38
Lateral excavation	[1] 325.00	32,432.71
Lateral lining, concrete	5,267.56	191,056.52
Metal flume, 3 feet 2¼ inches		2,180.87
Metal flume, 3 feet 9¾ inches		1,088.47
Siphon, 30 inches, steel, lateral No. 3		3,899.07
Siphon, 36 inches, cast-iron, lateral No. 30		811.77
State road siphon and turnout No. 20		908.58
Siphon under San Pedro, Los Angeles & Salt Lake R. R., 24 inches, cast iron and vitrified pipe, lateral 28		4,164.85
Siphon under Denver & Rio Grande R. R. and turnout 20 P. & Q., 36-inch cast-iron pipe		1,113.74
Siphon under San Pedro, Los Angeles & Salt Lake R. R., 30-inch cast-iron pipe, lateral 20-R		816.76
Siphon, 18-inch, vitrified pipe, lateral 27		1,545.77
Siphon, State road and turnout 20-C. D		1,199.48

Feature costs of Strawberry Valley project to June 30, 1918—Continued.

Features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Lateral systems—Continued.		
Divisions 5, 6, 7, 8, and 9—Continued.		
Minor structures—		
Concrete		$47,213.05
Timber		2,766.63
Pipe		20,666.00
Metal		1,634.41
	$4,942.56	350,761 06
Division 10—		
Lateral excavation		35,289.93
Lateral concrete canal lining		104,652.31
Metal flume No. 1, 3 feet 2¼ inches		1,781.02
Metal flume No. 3, 3 feet 2¼ inches		748.67
Metal flume No. 4, 5 feet 8¾ inches		1,093.02
Metal flume No. 5, 5 feet 8¾ inches		859.57
Metal flume No. 6, 5 feet 8¾ inches		939.77
Metal flume No. 7, 4 feet 5¼ inches		3,400.97
Metal flume No. 8, 4 feet 5¼ inches		1,652.98
Metal flume No. 9, 4 feet 5¼ inches		15,556.77
Metal flume No. 10, 4 feet 5¼ inches		660.28
Metal flume No. 11, 4 feet 5¼ inches		879.99
Metal flume No. 12, 3 feet 2¼ inches		825.62
Metal flume No. 13, 1 foot 11 inches		1,614.62
Measuring box, concrete for turnout 32–EF		708.26
Measuring box, concrete for turnout 32–CD		793.75
Siphon, 36-inch, steel, lateral 31		6,780.92
Pipe line, double-barrel, vitrified pipe, lateral 31		5,264.83
Culvert, 24-inch, vitrified pipe, lateral 31		1,345.65
Do		2,594.75
Culvert, State road and turnout 31–E2		1,218.22
Minor structures—		
Concrete		17,641.59
Timber		2,196.60
Pipe		9,488.84
	....	217,988.93
Mapleton lateral—		
Examination and surveys	2,734.81	2,734.81
Lateral excavation	53,041.75	53,041.75
Lateral lining, concrete	566.61	566.61
Headworks, intake at power canal	2,268.89	2,268.89
Siphon over Spanish Fork River, concrete	16,779.90	16,779.90
Siphon under Denver & Rio Grande R. R., concrete	5,869.50	5,869.50
Siphon over Hobble Creek, 27-inch, concrete	525.42	525.42
Minor structures—		
Concrete	3,473.60	3,473.60
Pipe	192.67	192.67
Timber	1,807.03	1,807.03
Metal	1,395.36	1,395.36
	88,655.54	88,655.54
Total lateral systems	93.598.10	657,405.53
Power system:		
Concrete arch and beam and slab covering, power canal	[1]105.98	....
Hydroelectric power plant	....	36,279.74
Penstock	....	8,241.13
Substation at Springville	3,479.64	3,479.64
Transmission lines—		
Power house to Spanish Fork	....	3,556.85
Power house to Payson City	....	6,810.27
Power house to Springville	6,601.30	6,601.30
Power house permanent camp	1,582.49	15,328.18
	11,557.45	80,297.11
Farm units	....	9,025.68

Feature costs of Strawberry Valley project to June 30, 1918—Continued.

Feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Permanent improvements:		
Diamond Fork wagon roads		$48,877.60
Provo office and grounds		5,260.00
Strawberry Valley grazing lands		61,085.65
		115,223.25
Telephone system: Line from Spanish Fork to Strawberry Dam		14,051.19
Operation and maintenance during construction		12,511.90
Balance in plant account	$9,651.67	13,996.16
Gross construction cost to June 30, 1918	85,342.53	3,469,871.92
Less revenues earned during construction period:		
Rental of buildings		5,675.80
Rental of grazing and farming lands		45,664.56
Net power losses (prior to public notice)		[1] 25,145.19
Rentals of irrigation water		400.00
Rentals of telephone and tolls		1,318.82
Contractors' freight refunds	105.25	691.61
Loss on hospital operations	576.30	[1] 2,695.66
	681.55	25,909.94
Net cost of construction of project to June 30, 1918		3,443,961.98

[1] Deduct.

Statement of cost by calendar years, Strawberry Valley project.

Year ending Dec. 31—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1907	$358,107.73				$358,107.73
1908	259,775.33				259,775.33
1909	200,684.30				200,684.30
1910	234,577.92				234,577.92
1911	538,013.86				538,013.86
1912	772,509.84				772,509.84
1913	[1] 1,870.02				[1] 1,870.02
1914	5,733.63	$69,420.68		$69,420.68	75,154.31
1915	746,220.44	3,779.23	$8,323.31	12,102.54	758,322.98
1916	194,074.66	[1] 60,688.01	18,037.06	[1] 42,650.95	151,423.71
1917	48,987.28		30,697.72	30,697.72	79,685.00
Jan. 1 to June 30, 1918	86,548.89		14,511.60	14,511.60	101,060.49
Plant accounts on June 30, 1918	13,996.16				13,996.16
Total	3,457,360.02	12,511.90	71,569.69	84,081.59	3,541,441.61

[1] Deduct.

NOTE.—The project was opened under public notice in 1915 and the appropriate costs for operation and maintenance under public notice were opened and taken out of operation and maintenance during construction.

Statement of cost by fiscal years, Strawberry Valley project.

Year ending June 30—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1906	$45,409.35				$45,409.35
1907	88,401 94				88,401.94
1908	292,288.51				292,288.51
1909	287,815.86				287,815.86
1910	193,766.85				193,766.85
1911	306,110.46				306,110.46
1912	691,590.78				691,590.78
1913	381,828.93				381,828.93
1914	52,519.18	$50,693.04		$50,693.04	103,212.22
1915	389,975.33	28,165.77		28,165.77	418,141.10
1916	377,203.63	7,180.11		7,180.11	384,383.74
1917	260,762.18	[1] 73,527.02	$36,505.07	[1] 37,021.95	223,740.23
1918	85,342.53		35,064.62	35,064.62	120,407.15
Plant account to June 30, 1917	4,344.49				4,344.49
Total	3,457,360.02	12,511.90	71,569.69	84,081.59	3,541,441.61

[1] Deduct.

The project was opened under public notice in 1915 and appropriate cost has been taken out of operation and maintenance during construction and debited to operation and maintenance under public notice.

Estimated cost of contemplated work, Strawberry Valley project, during fiscal year 1919.

Features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys:		
Trial lines	$1,575	
Soil surveys	712	
Test borings	713	
		$3,000
Lateral system (Mapleton lateral):		
Lateral excavation	4,000	
Concrete lining	3,000	
Hobble Creek siphon	15,000	
Minor structures	14,000	
		36,000
Operation and maintenance under public notice:		
Irrigation system—		
Spanish Fork diversion dam (proportion)	2,100	
Main distribution and power canal (proportion)	4,500	
High line canal and structures	550	
Strawberry Dam	3,500	
Indian Creek Dam	1,200	
Indian Creek feeder canal	1,100	
Trail Hollow feeder canal	1,100	
Strawberry Tunnel	3,300	
West portal weir	525	
Maintenance watercourse from West portal tunnel to Spanish Fork diversion dam	4,550	
West Portal measuring flume	1,050	
Hydrometry	5,400	
Examination and surveys	1,100	
Diamond Fork road maintenance	4,860	
High Line laterals and structures	550	
Power system—		
Central station	8,700	
Substation	1,300	
Transmission lines	1,400	
Spanish Fork diversion dam (proportion)	2,200	
Main distribution and power canal (proportion)	4,230	
Maintenance, grazing lands	1,589	
		54,804
Reimbursable accounts: Salaries physicians, hospital service, supplies, etc		1,196
Total		95,000

Operating costs and revenue, Strawberry Valley project, to June 30, 1918.

EXPENSES.

Features.	Fiscal year 1918.			To end fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage system:						
Strawberry Dam	$2,527.20	$1,189.68	$3,716.88	$2,971.60	$6,004.17	$8,975.77
Indian Creek dike	1,217.03	99.00	1,316.03	1,293.59	779.60	2,073.19
Indian Creek feeder canal	145.04	2.37	147.41	1,016.12	373.76	1,389.88
Trail Hollow feeder canal	125.33		125.33	977.87	186.69	1,164.56
Strawberry Tunnel	1,455.00	1,851.50	3,306.50	3,843.42	2,806.11	6,649.53
West portal barrier weir					22.40	22.40
Total storage system	5,469.60	3,142.55	8,612.15	10,102.60	10,172.73	20.275.33
Canal system:						
Highline canal				569.34	40.02	609.36
Watercourse from west portal of Strawberry Tunnel to Spanish Fork diversion dam	27.45	1,993.94	2,021.39	68.95	2,711.06	2,780.01
West portal measuring flume	19.00		19.00	125.86	3,073.04	3,198.90
Spanish Fork diversion dam	545.46	1,634.24	2,179.70	643.17	1,567.79	2,210.96
Main distribution and power canal	2,454.69	2,955.66	5,410.35	4,136.91	3,930.85	8,067.76
	3,046.60	6,583.84	9,630.44	5,544.23	11,322.76	16,866.99
Lateral system: High line laterals		32.71	32.71	279.35	32.71	312.06
Undistributed expenses:						
Telephone system	304.53	270.06	574.59	1,656.03	1,656.03	3,312.06
Camp maintenance	586.46	520.06	1,106.52	694.89	694.89	1,389.78
Superintendence and accounts	938.09	831.90	1,769.99	1,057.52	1,057.51	2,115.03
Engineering and inspection	35.46	31.44	66.90	37.61	37.62	75.23
General expenses	3,632.88	3,221.61	6,854.49	4,259.67	4,259.67	8,519.34
Total, undistributed expenses	5,497.42	4,875.07	10,372.49	7,705.72	7,705.72	15,411.44
Miscellaneous features:						
Hydrometry	2,997.80		2,997.80	10,401.50		10,401.50
Operation and maintenance surveys and investigations	1,604.75		1,604.75	1,843.16		1,843.16
Maintenance of Diamond Fork roads		1,721.36	1,721.36		6,366.29	6,366.29
Maintenance of Diamond Fork road bridges		92.92	92.92		92.92	92.92
Total miscellaneous features	4,602.55	1,814.28	6,416.83	12,244.66	6,459.21	18,703.87
Grand total	18,616.17	16,448.45	35,064.62	35,876.56	35,693.13	71,569.69

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$17,833.11	$39,085.57
Operation and maintenance charges paid in advance by water-right applicants	[1]3.70	11.20
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	135.37	162.14
Rental of land and buildings during operating period	524.00	1,458.00
Rentals of irrigation water	977.26	1,674.89
Rental of telephone and tolls during operating period	84.02	368.35
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants (contra)	[1]756.93	[1]1,548.62
Total	18,793.13	41,211.53
Difference (deficit)	16,271.49	30,358.16

[1] Deduct.

WASHINGTON, OKANOGAN PROJECT.

Calvin Casteel, project manager, Okanogan, Wash.

LOCATION.

County: Okanogan.

Townships: 33 to 34 N., Rs. 25 to 27 E., Willamette meridian.

Railroad: Great Northern (branch line).

Railroad stations and estimated population, June 30, 1918: Okanogan, 1,100; Omak, 550; Riverside, 250.

WATER SUPPLY.

Source of water supply: Salmon Creek.

Area of drainage basin: 121 square miles above Conconully Dam.

Annual run-off in acre-feet of Salmon Creek at Jones's ranch, near Okanogan (140 square miles), 1903 to 1917: Maximum, 56,500; minimum, 17,350; mean, 33,500.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1918: 10,099 acres.

Area under water-right applications, rental, and vested water-right contracts to June 30, 1918: 10,099 acres.

Length of irrigating season: May 1 to September 1—123 days.

Average elevation of irrigable area: 1,000 feet above sea level.

Rainfall on irrigable area: At Omak, Wash., 8-year average, 12.03 inches; 1917, 8.63 inches. At Conconully, Wash., at base of Salmon River watershed, 18-year average, 16 inches; 1917, 11.98 inches.

Range of temperature on irrigable area: −10° to 105° F.

Character of soil of irrigable area: Volcanic ash and gravel on upper benches and sand and gravel on lowlands along Okanogan River.

Principal products: Fruit, hay, grain, and vegetables.

Principal market: States east.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: November 12, 1908; March 12, 1910; April 8, 1910; February 23, 1911; March 28, 1911; April 29, 1912; July 6, 1912; March 10, 1913; June 16, 1913; January 16 and September 24, 1914; March 20, May 15, and July 28, 1915; March 16, 1916; April 18, 1917; March 19, and May 18, 1918.

Location of lands opened: Tps. 33 and 34 N., Rs. 25 to 27 E., Willamette meridian.

Limit of area of farm units: Public, 40 acres; private, 40 acres.

Duty of water: 2½ acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $95, subject to credit of $16 per acre in certain cases where landowners constructed and operate and maintain their own ditches.

Annual operation and maintenance charge: Effective for the irrigation season of 1918, and thereafter until further notice, by public notice dated May 18, 1918, the annual operation and maintenance charge is a minimum of $1.50 per acre payable whether water is used or not, which entitles the water user to 1 acre-foot of water delivered on his land, additional water being furnished at the rate of 50 cents for the first acre-foot and all further supply at 75 cents per acre-foot. During the flood period of each year each water user will be charged with only two-thirds of the water delivered to him.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1903.

Construction recommended by board of engineers, October 9, 1905.

Construction authorized by Secretary, December 2, 1905.

First irrigation by Reclamation Service, season of 1908.

Conconully Dam completed, August, 1910.

Water surface in Conconully Reservoir reached spillway crest for first time May 19, 1914.

Power and pumping system completed, 1916.
Concrete lining of canals and extension of distribution system completed, 1917.
Third unit opened, 1917.
Project 78 per cent completed, June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Okanogan project provides for the storage of water in Salmon Lake and in Conconully Reservoir, controlled by Conconully Dam on Salmon Creek, about 2 miles below Conconully, Wash.; the control of Salmon Lake Reservoir by a short inlet canal from Salmon Creek and concrete outlet works; the control of Conconully Reservoir by means of an outlet tunnel discharging into Salmon Creek below the storage dam; the diversion of water from Salmon Creek by a dam about 12 miles below the reservoir into a canal system watering lands in the valley of Okanogan River between Riverside and Okanogan, Wash.; and the construction and operation of a pumping plant to be used to supplement the gravity supply of the project by pumping from the Okanogan River to approximately 1,050 acres of land on the sandy portion of the project known as Robinson Flat, where the duty of water is less than on the heavier soils. The power for the pumping is generated by two power plants constructed at drops Nos. 1 and 2 on the upper main lateral and transmitted to the pumping station near the town of Omak by 5⅓ miles of transmission line. This pumping plant is to be operated only during years when the gravity supply of water will not be sufficient.

The following features of the project—consisting of the inlet canal and outlet works to Salmon Lake; Conconully hydraulic filled dam, spillway, and outlet works; the diversion weir and distribution system—are completed and have been in use during irrigation seasons since 1910.

SUMMARY OF GENERAL DATA FOR OKANOGAN PROJECT TO END OF FISCAL YEAR 1918.

Areas:			
Irrigable acreage when project is complete			10,099
Private land		10,099	
Acreage service could have supplied season of 1917			10,099
Estimated acreage service can supply July 1, 1919			10,099
Acreage actually irrigated, season of 1917			8,000
Acreage cropped under irrigation, season of 1917			6,314
Crops:			
Value of irrigated crops, season of 1917			$616,640
Value of irrigated crops, per acre cropped			$97.66
Finances:			
Net construction cost to end of fiscal year			$848,577.52
Per cent complete at end of fiscal year			78
Appropriated for fiscal year 1919, total			$154,000
Allotment for construction, fiscal year 1919			$125,000
Estimated per cent complete, June 30, 1919			89
Proposed appropriation, fiscal year 1920, for construction			$271,500
Estimated gross construction cost to June 30, 1920			$1,247,000
Estimated per cent complete, June 30, 1920			100
Announced construction charges per acre			$95
Appropriation, fiscal year 1918			[1] $40,701.57
Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$26,120.87		
Transfers	1,461.52		
		$27,582.39	
Registered liabilities chargeable to 1918 appropriation		3,449.70	
Contract obligations wholly covered by 1918 appropriation		2,100.00	
			33,132.09
Unencumbered balance, July 1, 1918			7,569.48

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[1] Includes refunds authorized to be added to 1918 appropriation by sundry civil act of June 12, 1917.

Repayments:	
Value of construction water-right contracts	$811,649.02
Construction charges—	
Accrued to end of fiscal year	34,041.54
Collected to end of fiscal year	31,232.53
Uncollected at end of fiscal year	2,809.01
Operation and maintenance charges (public notice)—	
Accrued to end of fiscal year	55,316.22
Collected to end of fiscal year	46,776.97
Uncollected at end of fiscal year	8,539.25
Water-rental charges—	
Accrued to end of fiscal year	106,199.82
Collected to end of fiscal year	99,200.92
Uncollected at end of fiscal year	6,998.90
Power earnings—	
Accrued to end of fiscal year	1,754.71
Collected to end of fiscal year	1,754.71

CONSTRUCTION DURING FISCAL YEAR.

All contemplated construction work had practically been completed at the close of the fiscal year 1917. The only work performed during the fiscal year 1918 was the completion of a few minor structures in connection with improvement of the South Side Canal and extension of the distribution system. This work was performed during the latter part of the summer of 1917.

OPERATION AND MAINTENANCE.

The irrigation season of 1917 began with delivery of water on May 20 and continued uninterruptedly until September 2. Water was again delivered from September 7 to 15 and from October 14 to 16. The system was operated for a total of 117 days. On account of the backward spring it was impossible to get the canals cleaned and finish up the concrete lining, which had been held over from the previous season, in time to turn on the water at the usual date. A heavy snow occurred on the project on March 12 and it was not until early April that the weather had moderated and the frost left the ground sufficiently to permit beginning field work.

The growing season was very backward and fruit trees did not come out in full bloom until about the 10th of May, which was two or three weeks later than normal. The season as a whole was unfavorable for production of crops, being cold and backward throughout the spring and very hot and dry during the summer. The maximum temperature for the year was 107° and the total precipitation 8.63 inches. The mean rainfall for eight years, including 1917, was 12.03 inches. The total from July 1 to October 31 was only 0.35 inch, and on this account, as well as the shortage of irrigation water toward the close of the summer, there was some loss of fruit, but this was more than offset by the favorable prices received.

Classification of lands.—The classification of lands into A, B, and C classes, according to quality of soil, was continued during the season of 1917 and delivery of water made at the rate of 1, 1½, and 2 acre-feet, respectively, for the minimum operation and maintenance charge of $1.50 per acre with an additional charge of 50 cents per acre for the first acre-foot and 75 cents per acre for all further supply. The delivery to the B and C classes, which are the sandy lands of the project, was excessive, the average use being from 5 to 6 acre-feet. It was on account of these deliveries that the reservoir became emptied before the close of the season.

Operation of system.—The entire distribution system was operated without interruption from the date water was first delivered on May 21 until it was shut off on September 2. The system operated included 27 miles of iron pipe lines, 37 miles of concrete-lined canals, and 15 miles of open earth ditches together with the attendant structures for controlling and delivering the water, about 2,100 in number. There were diverted for irrigation by the various canals and private ditches comprising the distribution system 25,182 acre-feet. Of this quantity 19,901 acre-feet were delivered to the farms, or 2.49 acre-feet per acre irrigated. The seepage and evaporation losses in the distribution system amounted to 5,057 acre-feet, or 17.47 per cent. The total area irrigated was 8,000 acres, of which 6,760 acres were located under the canals of the project distribution system.

The operation cost for the year was $10,122.65; maintenance, $7,424.80; total of $17,547.45, or $1.73 per acre irrigable.

The rotative system of water delivery was practiced as during former years, the rotation period being 7 days. The operation of the system was handled by 6 patrolmen, each having approximately 75 deliveries. Each patrolman furnishes his own saddle horse as well as feed and care.

The run-off for 1917 amounted to 24,822 acre-feet. As the greater portion of this run-off occurred before the beginning of the irrigation season, and as there were 7,838 acre-feet in storage at the beginning of the year, or practically one-half of the total storage capacity of the project, the water surface in Conconully Reservoir reached the spillway crest on May 30, or only a few days after water was turned on for irrigation. The reservoir remained full until June 21, and during this period 4,550 acre-feet ran over the spillway and were wasted. At the close of the year the water in storage amounted to 2,065 acre-feet.

Power plant No. 1, in connection with the Robinson Flat pumping system, was operated from June until August for delivery of commercial power under contract with the Okanogan Valley Power Co. Early in August when it became apparent that there was the probability of a shortage of water, operation of power plant No. 2 was also begun and the Robinson Flat pumping plant was operated for the remainder of the season. The power system during the season generated a total of 173,460 kilowatt hours, of which 110,769 kilowatt hours were used for irrigation pumping and 62,691 kilowatt hours sold to consumers. The net earnings from the sale of this power were $952.84. The pumping plant was operated from August 11 to September 2 and pumped 254 acre-feet a height of 188 feet at a cost of 13 cents per foot acre-foot.

During the period from April 6 to September 14, inclusive, Conconully Dam was patrolled by four guards who were commissioned as special deputy United States marshals as a measure of safety for the protection of this structure and other property of the United States at this point.

The maintenance work for the season was handled by a permanent crew of 4 men with 1 team. This work consisted of routine repairs to structures, mowing weeds along the canal right of way, and repairs to canal banks. Due to weeds blowing into the canals and accumulating behind the structures two small washouts occurred early in the season at the lower end of the upper main lateral. Similar trouble was experienced at the lower end of the low line canal which also caused a washout. These breaks were all repaired before serious damage was done and it was only necessary to shut off the water in the location of each washout for a short time.

Season of 1918.—The winter of 1917–18 was one of the mildest on record. Although the minimum temperature, which occurred on January 31, was −5° this cold snap was of short duration and as a whole the weather was mild. The winter was also unusual for its light precipitation, the snowfall being only about one-half of normal. Due to the fact that the water supply in storage had been seriously depleted the previous season and to the lack of snowfall during the winter it became apparent with the opening of spring that the project was facing the probability of a serious water shortage. There was no usual spring flood of Salmon Creek, and when the irrigation season opened with delivery of water on May 6, there were in storage only 4,695 acre-feet. On account of dry weather through the spring it was necessary to begin delivery of water at this time as the orchards and alfalfa were beginning to suffer for lack of water. The first irrigation extended from May 6 to 19 and during this period 2,180 acre-feet were delivered to the users, or about 0.3 acre-foot for the 7,100 acres irrigated. The second irrigation extended from June 10 to 20 and during this period 2,400 acre-feet were delivered to the land, which was at about the same rate as the first irrigation, making a total delivery for the season to June 30 of about 0.6 foot on the land. The total precipitation for the year ending June 30, 1918, was only 6.53 inches, and at this time the project was facing the worst drought in its history. A number of small pumping plants were installed by those farmers who had springs or small lakes adjacent to their farms from which water could be had, but in other localities where the supply was limited to that delivered from the project canals the orchards were as a rule in very bad condition, especially where alfalfa or other cover crop was grown.

On June 24 work was commenced on the installation of a pumping plant at Salmon Lake Reservoir for pumping out the waters of this lake below the level of the present outlet. A 125-horsepower gasoline engine and 2 large pumps with a combined capacity of 25 cubic feet per second were transferred from other projects for this plant. This lake offered the only available means for quick relief, and this was only partial, as it was estimated that only about 1,400 acre-feet could be secured by pumping before the close of the irrigation season. Congress appropriated $125,000 for emergency work in order to provide a supplemental water supply, and at the close of the fiscal year investigations had been started to determine the best methods for expenditure of this money.

The area irrigated this season was only about 7,100 acres, or 900 acres less than the previous year. This decrease was due to the area of class B and C lands on Robinson Flat, which were not irrigated on account of shortage of water, and the elimination of the classification which had permitted a larger delivery to these lands than to the class A lands for the same minimum charge. The shortage of water would not permit delivery of any extra water to these lands this season.

Historical review, Okanogan project.

Item.	1913	1914	1915	1916	1917	1918[1]
Acreage for which service was prepared to supply water.	10,084	10,099	10,099	10,099	10,099	10,099
Acreage irrigated	7,700	7,740	7,800	7,850	8,000	7,100
Miles of canal operated	47	74	77	77	79	79
Water diverted (acre-feet)	20,300	29,700	24,640	25,947	25,182	14,000
Water delivered to land (acre-feet)	11,993	20,035	18,580	19,615	19,901	11,000
Per acre of land irrigated (acre-feet)	1.57	2.59	2.38	2.50	2.49	1.55

[1] Estimated.

SETTLEMENT.

There was no movement of lands nor influx of settlers noticeable during the year. Land values are not advancing and on the poorer classes of unimproved land are actually decreasing. This is due to uncertain market conditions and instability of the fruit industry. Good prices were received for the output last year and the class A lands in most instances yielded a fair crop. The financial condition of the settlers on these lands is improving from year to year, due to the fact that they have had good crops which have brought fair returns during the last two years.

The land-investment report, compiled at the close of the season of 1917, shows a total gross land value for the project of $2,780, 000, or about $340 per acre for the area cleared and leveled. The total value of stock and equipment is approximately $200,000, or about $25 per acre based on the area cleared and cultivated. There was a slight increase in bank deposits of the three towns in and adjacent to the project. Considerable development work was done during the year, consisting of erection of packing sheds and other improvements to farm buildings. The number of automobiles in use for pleasure purposes among the farmers is increasing from year to year, and the garage business is among the most thriving in the towns of the project. The towns of Okanogan and Omak continue to advance both in population and in municipal improvements. The former especially, which is the county seat, has made numerous improvements to streets, and a number of new dwellings and business houses have been erected.

Settlement data, Okanogan project.

Item.	1914	1915	1916	1917	1918
Total number of farms on project	550	560	560	560	594
Population	921	900	1,021	1,050	1,000
Number of irrigated farms	450	440	458	475	450
Operated by owners or managers	448	434	453	465	435
Operated by tenants	2	6	5	10	15
Population	921	900	1,021	1,050	1,000
Number of towns	3	3	3	3	3
Population	1,350	1,500	1,600	1,700	1,900
Total population in towns and on farms	2,271	2,400	2,621	2,750	2,900
Number of public schools	7	7	7	7	7
Number of churches	7	8	8	8	8
Number of banks	4	4	4	4	4
Total capital stock	$135,000	$135,000	$135,000	$135,000	$135,000
Amount of deposits	$272,000	$325,000	$400,000	$450,000	$500,000
Number of depositors	1,589	1,650	1,700	1,750	1,800

PRINCIPAL CROPS.

The area cropped during the year was 6,314 acres. The total value of the crops produced was $616,640, or $97.66 per acre cropped. The increase in cropped area was about 20 per cent and in total crop production about 87 per cent over the corresponding figures for the previous year. These increases were due almost entirely to greater yields of apples and alfalfa. The area producing apples increased from 3,795 to 4,637 acres and in alfalfa from 1,511 to 1,933 acres. The total value of these two crops was $564,000. Of the 8,000 acres irrigated, about 5,700 acres are planted to bearing and nonbearing orchard, 1,340 acres to alfalfa, and 960 acres to miscellaneous crops. The price of alfalfa ranged from $11 to $21 per ton and averaged for the season $15. The apple returns averaged $1.10 per box for a total of 450,442 boxes, or 590 car loads. The average price of peaches was 40 cents per box, apricots 80 cents, cherries $1, and pears $1. Total fruit shipments aside from apples amounted to 12 cars. During the year 475 farms, containing a total irrigable area of 8,679 acres, were cultivated.

Crop report, Okanogan project, Washington, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	1,933.4	Ton	4,588	2.4	$15.00	$68,826	$35.60
Apples	4,637.1	Pound	18,017,680	3,886.0	.02¾	495,486	106.85
Apricots	16.5	...do	103,050	6,245.0	.02	2,061	124.91
Beans	117.5	Bushel	722.5	6.2	6.00	4,362	37.12
Beets	.25	Ton	1	4.0	15.00	15	60.00
Carrots	.75	...do	16	21.3	15.00	240	320.00
Clover	29.50	...do	43	1.5	15.00	645	21.86
Corn	112.25	Bushel	2,679.3	23.9	1.16	3,257	29.01
Corn, fodder	58.1	Ton	134.75	2.3	10.00	1,348	23.20
Fruits, small	17.25	Pound	....	....	....	3,011	174.55
Garden	81.9	....	....	....	....	9,215	112.51
Hay, other	140.5	Ton	136	0.9	15.00	2,041	14.52
Onions	2.0	....	....	....	....	431	215.50
Pasture	137.5	....	....	....	....	2,165	15.75
Peaches	73.75	Pound	266,100	3,612	.02	5,322	72.16
Pears	13.25	...do	94,535	7,135	.02⅞	2,701	20.38
Prunes	4.5	...do	20,500	4,556	.02	410	91.11
Potatoes	141.6	Bushel	13,383	94.5	.60	8,041	56.79
Wheat	59.5	...do	758	12.7	2.60	1,966	33.04
Miscellaneous	42.9	....	....	....	....	5,097	118.81
Total	7,620						
Less duplicated areas	1,306.0						
Total cropped acreage.	6,314.0	Total and average				616,640	97.66

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Total irrigable area farms reported	8,679	475	85.8
Nonbearing orchard	881.0	Total irrigated area farms reported	8,000	475	79.3
Young alfalfa	139.0	Under water-right applications	7,298	435	72.3
Miscellaneous	860.0	Under rental contracts	....	....	....
Less duplicated areas	194.0	Vested water rights	1,381	40	13.6
		Total cropped area farms reported	6,314	475	62.5
Total irrigated	8,000.0				

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, MARCH 19, 1918.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, and in accordance with agreements heretofore made, providing for additional construction for lands having vested water rights under the south side ditch, Okanogan project, Washington, public notice is hereby issued as follows:

2. **Lands for which water will be furnished.**—The necessary construction work having been performed, water will be furnished under said project in the irrigation season of 1918 and thereafter, for irrigable lands in sections 5, 7, 8, 17 and 18, T. 33 N., R. 26 E., W. M., described as follows: Section 5, SW. ¼ NW. ¼, NW. ¼ SW. ¼, SW. ¼ SW. ¼, SE. ¼ SW. ¼, section 7, SE. ¼ SE. ¼; section 8, NE. ¼ NW. ¼, NW. ¼ SW. ¼, SW. ¼ SW. ¼; section 17, NW. ¼ NW. ¼, NE. ¼ NW. ¼, NW. ¼ NE. ¼, SE. ¼ NW. ¼, SW. ¼ NW. ¼, NW. ¼ SW. ¼; section 18, SE. ¼ NE. ¼, NE. ¼ SE. ¼, SE. ¼ SE. ¼.

3. **Classes of charges for water rights.**—The water-right charges are of two kinds, to-wit: (1) A charge against each irrigable acre to cover cost of additional construction for the irrigation system, provided by said agreements, termed the additional construction charge; and (2) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

4. **Additional construction charge.**—The additional construction charge for said lands shall be $18.50 per irrigable acre. Said charges shall be paid in ten equal annual installments, of $1.85 each, the first of which shall be due and payable December 1, 1918, and subsequent installments on December 1 of each year thereafter, with interest at the rate of 12 per cent per annum upon all sums remaining due and unpaid.

5. **Advance payment of additional construction charge permissible.**—Any water applicant in question may, at his option, pay in advance the whole or any part of the additional construction charge owing by him within any shorter period than that prescribed by this notice.

6. **Operation and maintenance charge.**—The operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice, shall be in the same amounts and payable at the same times and under the same terms and conditions as the operation and maintenance charges announced for other lands of the project by public notice, dated April 18, 1917.

7. **Place and method of payment of water right charges.**—All water right charges must be paid at the office of the United States Reclamation Service at Okanogan, Wash., in cash, or by New York draft, or money order, payable to special fiscal agent, United States Reclamation Service.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, MAY 18, 1918.

1. **Annual operation and maintenance charges.**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charge for the irrigation season of 1918 and thereafter until further notice, against all lands of the Okanogan project, Washington, under public notice, shall be a minimum charge of $1.50 per irrigable acre, whether water is used thereon or not, which will entitle the water user to 1 acre-foot of water, measured on the land; further water will be furnished up to a limit of 1 additional acre-foot per irrigable acre at the rate of 50 cents per acre-foot, and all further supply at 75 cents per acre-foot. During the flood period of each year, as determined by the project manager, each water user will be charged with only two-thirds of the water delivered. All operation and maintenance charges will be due and payable on March 1, following the irrigation season; but where water right application is made for land in private ownership after August 1, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water right application is made.

S. G. Hopkins,
Assistant Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Okanogan project, June 30, 1918.

Cash		$50.90
Inventory of stock on hand		5,594.66
Accounts receivable		795,954.64
Construction cost	$851,145.32	
Less construction revenue earnings	2,567.80	
		848,577.52
Operation and maintenance cost	122,625.63	
Less operation and maintenance revenue earnings	107,757.80	
		14,867.83
Total		1,665,045.55
Accounts payable		9,251.77
Contingent obligations		50.90
Reserves for repayment to reclamation fund of cost of project		867,697.53
Miscellaneous accruals		952.84
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	990,724.38	
Collection, transfer, refund, and joint construction vouchers issued	203,631.87	
Net investment		787,092.51
Total		1,665,045.55

Feature costs of Okanogan project to June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys		$4,603.27
Storage works:		
Salmon Lake Reservoir—		
Inlet canal		1,999.00
Outlet works		6,578.52
Salmon Lake Dam		2,486.01
		11,063.53
Conconully Reservoir—		
Real estate	$2,684.98	45,363.58
Clearing reservoir site		8,913.05
Conconully Dam		221,830.99
Spillway		37,770.79
Outlet works		24,499.19
	2,684.98	338,377.60
	2,684.98	349,441.13
Pumping for irrigation:		
Power plant No. 1	54.00	11,923.44
Power plant No. 2	62.63	13,931.42
Pumping plant		30,077.24
	116.63	55,932.10
Lateral system:		
Diversion weir in Salmon Creek		4,152.89
Main canal, main laterals, and sublaterals	205.46	403,664.51
	205.46	407,817.40
Power system, transmission line		5,445.83
Farm units		1,889.92
Permanent improvements:		
Roads		1,105.98
Buildings	1,115.43	8,380.73
	1,115.43	9,486.71
Telephone system		6,698.10
Operation and maintenance during construction		4,736.36
Unadjusted clearing accounts	193.83	193.83
Balance in plant accounts	3,586.20	4,900.67
Gross construction cost to June 30, 1918	7,902.53	851,145.32
Less revenues earned during construction period:		
Rental of buildings		224.00
Rental of grazing and farming lands		540.00
Rentals of irrigation water		1,670.50
Profit on hospital operations	47.65	281.23
Losses on operations, unclassified	[1] 140.20	[1] 147.93
	[1] 92.55	2,567.80
Net construction cost to June 30, 1918		848,577.52

[1] Deduct.

Statement of cost by calendar years, Okanogan project.

Year ending Dec. 31—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1903	$12,854.78				$12,854.78
1904	5,037.06				5,037.06
1905	8,353.56				8,353.56
1906	64,175.40				64,175.40
1907	233,066.03				233,066.03
1908	106,856.55	$4,138.88		$4,138.88	110,995.43
1909	84,457.58	597.48	$6,985.35	7,582.83	92,040.41
1910	41,424.39		10,236.20	10,236.20	51,660.59
1911	8,312.40		17,052.52	17,052.52	25,364.92
1912	48,857.05		13,643.66	13,643.66	62,500.71
1913	46,820.20		9,508.76	9,508.76	56,328.96
1914	86,932.97		9,782.69	9,782.69	96,715.66
1915	48,501.61		11,935.89	11,935.89	60,437.50
1916	23,636.76		13,983.82	13,983.82	37,620.58
1917	19,583.97		17,547.45	17,547.45	37,131.42
Jan. 1 to June 30, 1918	2,444.15		11,002.49	11,002.49	13,446.64
Plant and clearing accounts on June 30, 1918	5,094.50		946.80	946.80	6,041.30
Total	846,408.96	4,736.36	122,625.63	127,361.99	973,770.95

Statement of cost by fiscal years, Okanogan project.

Year ending June 30—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1903	$991.31				$991.31
1904	14,549.91				14,549.91
1905	4,550.62				4,550.62
1906	13,739.41				13,739.41
1907	148,141.69				148,141.69
1908	195,503.16	$2,703.12		$2,703.12	198,206.28
1909	98,431.17	2,033.24	$3,588.92	5,622.16	104,053.33
1910	80,212.40		8,588.62	8,588.62	88,801.02
1911	4,974.75		15,321.94	15,321.94	20,296.69
1912	28,937.77		15,158.17	15,158.17	44,095.94
1913	41,562.49		12,289.34	12,289.34	53,851.83
1914	56,180.31		8,502.35	8,502.35	64,682.66
1915	95,926.53		10,313.00	10,313.00	106,239.53
1916	28,775.90		13,534.42	13,534.42	42,310.32
1917	24,714.54		13,238.20	13,238.20	37,952.74
1918	7,902.53		21,769.29	21,769.29	29,671.82
Undistributed clearing accounts on June 30, 1917			321.38	321.38	321.38
Plant accounts on June 30, 1917	1,314.47				1,314.47
Total	846,408.96	4,736.36	122,625.63	127,361.99	973,770.95

Estimated cost of contemplated work, Okanogan project, during fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919.
Storage works: Salmon Lake Reservoir, Salmon Lake Dam	$116,000.00
Pumping for irrigation: Duck Lake pumping plant	8,000.00
Operation and maintenance under public notice	29,500.00
Reimbursable accounts	500.00
Total	154,000.00

Operating costs and revenues, Okanogan project, to June 30, 1918.

EXPENSES.

Feature.	Fiscal year 1918.			To end fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works:						
Salmon Lake Reservoir	$383.76	$251.94	$635.70	$1,477.96	$392.91	$1,870.87
Conconully Reservoir	3,239.17	19.32	3,258.49	10,981.80	768.32	11,750.12
	3,622.93	271.26	3,894.19	12,459.76	1,161.23	13,620.99
Pumping for irrigation	1,817.46	1,100.53	2,917.99	1,817.46	1,100.53	2,917.99
Lateral system:						
Diversion dam		31.64	31.64		103.58	103.58
Private ditch diversions		141.56	141.56		1,003.86	1,003.86
South side canal	905.26	183.61	1,088.87	1,020.92	220.79	1,241.71
Main canal	1,139.95	1,899.91	3,039.86	5,230.83	8,526.16	13,756.99
Upper main lateral	2,401.33	3,632.38	6,033.71	13,994.16	25,148.58	39,142.74
Lower main lateral	1,348.90	2,623.83	3,972.73	9,088.85	16,748.85	25,837.70
	5,795.44	8,512.93	14,308.37	29,334.76	51,751.82	81,086.58
Undistributed expenses:						
Buildings		23.32	23.32		2,242.45	2,242.45
General expense				8,461.35	13,349.47	21,810.82
		23.32	23.32	8,461.35	15,591.92	24,053.27
Undistributed clearing account	325.42	300.00	625.42	394.50	552.30	946.80
Total	11,561.25	10,208.04	21,769.29	52,467.83	70,157.80	122,625.63

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$18,148.99	$55,316.22
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	6.42	8.47
Rental of land and buildings during operating period	341.05	2,234.12
Rentals of irrigation water	328.80	104,529.32
Other revenues, unclassified, earned during operating period	971.54	994.36
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants (contra)	[1] 344.83	[1] 354.03
Total	19,451.97	162,728.46
Difference; deficit and excess	[2] 2,317.32	40,102.83

[1] Deduct.

[2] Deficit.

WASHINGTON, YAKIMA PROJECT.

R. K. TIFFANY, project manager, Yakima, Wash.

LOCATION.

Counties: Yakima, Benton, and Kittitas.

Townships: 8 to 22 N., Rs. 11 to 27 E., Willamette meridian.

Railroads: Northern Pacific; Chicago, Milwaukee & St. Paul; Union Pacific System; Yakima Valley Transportation Co.

Railroad stations and estimated population June 30, 1918: Grandview, 800; Sunnyside, 1,430; Outlook, 150; Granger, 360; Zillah, 500; Mabton, 600; Donald, 50; Benton City, 50; Prosser, 1,500; Ellensburg, 5,000; Thorp, 300; Union Gap, 200; Yakima, 20,000; Naches, 500; Wapato, 500; Toppenish, 1,700; and Parker, 50.

WATER SUPPLY.

SUNNYSIDE UNIT.

Source of water supply: Yakima River and tributaries.

Area of drainage basin: 3,550 square miles.

Annual run-off in acre-feet of Yakima River at Union Gap: 3,550 square miles, 1897 to 1917, maximum, 4,680,000; minimum, 1,570,000; mean, 3,290,000.

TIETON UNIT.

Source of water supply: Tieton River and its tributaries.

Area of drainage basin: 247 square miles.

Annual run-off in acre-feet of Tieton River at canal headworks, 1908–1917, maximum, 484,000; minimum, 252,000; mean, 300,000.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1918: Sunnyside unit, 98,537 acres; Tieton unit, 32,000 acres.

Area under water-right applications and rental contracts, season of 1918: Sunnyside unit, 93,095 acres; Tieton unit, 30,880 acres.

Length of irrigating season: Sunnyside unit, April 1 to October 31, 214 days; Tieton unit, May 1 to October 1, 153 days.

Average elevation of irrigable area: 1,000 feet above sea level.

Rainfall on irrigable area: At Sunnyside, 1895 to 1917, average, 6.65 inches; 1917, 5.49 inches; at Tieton, 1912 to 1917, average, 9.54 inches; 1917, 7.08 inches.

Range of temperature on irrigable area: —21° to 110° F.

Character of soil of irrigable area: Sunnyside unit—on about three-fourths of the unit the soil is sandy loam or volcanic ash from 10 to 60 feet deep. The remainder is decomposed basalt, underlain by gravel or a combination of this with the above-named soils. Tieton unit—volcanic ash.

Principal products: Forage, hops, vegetables, and fruit; stock and dairy products.

Principal markets: Cities of the Northwest, British Columbia, and Alaska; fruit markets, the entire United States.

LANDS OPENED FOR IRRIGATION.

SUNNYSIDE UNIT.

Dates of public notices: November 18, 1908; March 2, 1909; April 18, April 19, May 2, 1910; March 15, 1911; February 29, May 31, 1912; June 16, June 23, October 2, 1913; March 10, April 11, and September 24, 1914; March 31, July 27, 1915; April 6, May 31, 1916; May 16, 1917; April 4, May 6, 1918.

Location of lands opened: Tps. 8 to 12 N., Rs. 19 to 27 E., Willamette meridian.

Duty of water: 3 acre-feet per acre per annum at the farm.

Limit of area of farm units: Public, 80 acres; private, 160 acres.

Building charge per acre of irrigable land: $52 to $64.

Annual operation and maintenance charge: $1 per acre vested water rights; for public notice lands a minimum of $1.25, which will permit delivery of not more than the following amounts per irrigable acre: To lands of class A, 2 acre-feet; to lands of class B, 2½ acre-feet; to lands of class C, 3 acre-feet. For additional water above the foregoing amounts, the rate shall be 50 cents per acre-foot. Provided, that for newly reclaimed lands no charge will be made for water actually needed in excess of the amount covered by a charge of $2 per irrigable acre at the said rates.

TIETON UNIT.

Dates of public notices and orders: November 7, 1910; March 8, April 14, 1911; January 24, February 21, April 18, May 10, 1912; March 21, April 25, June 16, 1913; March 4, September 24, 1914; March 9, March 20, October 30, 1915; March 16, April 3, 1916; March 17, 1917; April 12, 1918.

Location of lands opened: Tps. 12 to 15 N., Rs. 16 to 18 E., Willamette meridian.

Duty of water: That quantity of water which shall be beneficially used for the irrigation of the lands and in no case exceed the share proportionate to irrigable acreage of water supply actually available. The average use is about 2 acre-feet per acre delivered at the farm.

Limit of area of farm units: Public, 40 acres; private, 160 acres.

Building charge per acre of irrigable land: $93 plus $11.63 supplemental construction.

Annual operation and maintenance charge: For all water delivered between June 20 and August 31, inclusive, $1 per acre-foot; for all water delivered at other times during the irrigation season, 60 cents per acre-foot; with a minimum of $1.25 per irrigable acre whether water is used or not, which minimum amount when paid is credited upon the account for water delivered at the above acre-foot rates.

CHRONOLOGICAL SUMMARY

Reconnoissance and preliminary surveys in 1903.

Report of Board of Engineers recommending construction October 16, 1905.

Construction of Sunnyside and Tieton units authorized by Secretary December 12, 1905; Wapato unit, June 16, 1906.

Sunnyside Canal purchased June 23, 1906.

First irrigation by Reclamation Service, Sunnyside unit, season of 1907.

Tieton diversion dam completed December, 1908.

Tieton Main Canal completed in 1909.

Bumping Lake Dam completed in 1910.

First irrigation by Reclamation Service, Tieton unit, season of 1911.

Tieton unit completed winter of 1911–12.

Kachess Dam completed fall of 1912.

Warren Act contract with Kittitas reclamation district executed by Secretary of Interior January 18, 1913.

Contract with Sunnyside irrigation district signed October 6, 1914.

Contract with Snipes Mountain irrigation district signed November 16, 1914.

Contract with Outlook irrigation district signed November 23, 1914.

Construction for Sunnyside irrigation district (Benton extension) completed April, 1916.

Construction for Outlook irrigation district completed June 1, 1916.

Construction for Snipes Mountain irrigation district completed June 30, 1916.

Contract with Grandview irrigation district signed August 4, 1916. Construction completed July 31, 1917. Construction, gravity system, completed June 30, 1917.

Contract with Prosser Irrigation District signed December 1, 1917.

Per cent completed June 30, 1918: Storage unit, 38 per cent; Sunnyside unit, 93 per cent; Tieton unit, 95 per cent.

IRRIGATION PLAN.

The irrigation plan of the Yakima project provides for the storage of flood waters of the Yakima River and its tributaries in Kachess, Keechelus, Clealum, and Bumping Lakes, and in a reservoir at McAlister Meadows; the diversion of water from the Yakima River for the irrigation of 62,000 acres of land on both sides of the river in the vicinity of Ellensburg, comprising the Kittitas unit; the diversion of water from the east bank of the Yakima River near Parker for the irrigation of 110,828 acres of land by means of the old Sunnyside Canal, as improved and extended by the Reclamation Service, comprising the Sunnyside unit; the diversion of water from the Tieton River below McAlister Meadows (a reservoir being provided on the headwaters of this stream to regulate diurnal flow) for the irrigation of 32,000 acres of land lying between the Naches River and Ahtanum Creek, in the vicinity of Yakima, comprising the Tieton unit; and the diversion of water from the west bank of the Yakima River near Parker for the irrigation by means of the canal system of the Yakima Indian Reservation, improved and extended, of 106,000 acres of land by gravity and 14,000 acres of land by pumping with power developed at drops in the canals, comprising the Wapato unit. The plan also provides for the development of power from drops in the main canals and laterals of the Sunnyside and Tieton units to be used for pumping irrigation water and for other purposes. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The following features of the above plan have been completed: Sunnyside unit: Diversion dam, enlargement of main canal, Sulphur Creek wasteway, and the distribution system; Benton extension (Sunnyside irrigation district); Snipes Mountain irrigation district (pumping unit); Outlook irrigation district (pumping unit); Grandview irrigation district (pumping unit). Tieton unit: Bumping Lake storage dam, Clear Creek Dam, Tieton River diversion dam, main canal, and distribution system.

Kachess Dam; minor construction work on the dam and clearing of the reservoir area at Lake Keechelus have been in progress. The outlet tunnel at Tieton Reservoir has been completed.

The works for the Prosser irrigation district (pumping unit) are now under construction. Features for future construction are the Granger siphon, Mabton pumping plant, Clealum and Tieton Reservoirs. Surveys for new canal systems to serve from 150,000 to 200,000 acres of first-class land are under way. The lands to be irrigated lie above existing canals in the Naches, Selah, Moxee, Sunnyside, and Cold Creek Valleys north of the Yakima River, and a body of land between Kiona and Kennewick south of the Yakima River.

SUMMARY OF GENERAL DATA FOR YAKIMA PROJECT TO END OF FISCAL YEAR 1918.

STORAGE UNIT.

Finances:			
Net construction cost to end of fiscal year			$3,607,064.75
Per cent complete at end of fiscal year			38
Appropriated for fiscal year 1919, total			$175,500.00
Allotment for construction, fiscal year 1919			$133,000.00
Estimated per cent complete, June 30, 1919			39
Proposed appropriation, fiscal year 1920, for construction			$50,000.00
Estimated gross construction cost to June 30, 1920			$3,927,000.00
Estimated per cent complete, June 30, 1920			39+
Appropriation fiscal year 1918			[1] $1,017,500.00
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$879,406.01		
Transfers	46,387.78		
		$925,793.79	
Registered liabilities chargeable to 1918 appropriation		47,914.15	
Contract obligations wholly covered by 1918 appropriation		26,151.43	
			999,859.37
Unencumbered balance July 1, 1918			17,640.63
Repayments:			
Value of construction water-right contracts			666,670.00
Construction charges—			
Accrued to end of fiscal year			414,281.00
Collected to end of fiscal year			413,351.00
Uncollected at end of fiscal year			930.00

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[1] Includes refunds authorized to be added to 1918 appropriation by sundry civil act approved June 12, 1917.

Repayments—Continued.			
Operation and maintenance charges under special contract—			
Accured to end of fiscal year			$21,721.57
Collected to end of fiscal year			21,692.03
Uncollected at end of fiscal year			29.54
Water-rental charges—			
Accrued to end of fiscal year			4,305.00
Collected to end of fiscal year			4,305.00

SUNNYSIDE UNIT.

Areas:			
Irrigable acreage when project is complete			110,828
Public land entered to end of fiscal year		2,588	
Public land withdrawn at end of fiscal year		39	
State land		1,158	
Private land		107,043	
Acreage service could have supplied season of 1917			97,182
Addition in fiscal year 1918			1,355
Estimated addition in fiscal year 1919			2,150
Estimated acreage service can supply July 1, 1919			100,676
Acreage actually irrigated, season of 1917			80,500
Acreage cropped under irrigation, season of 1917			65,803
Crops:			
Value of irrigated crops, season of 1917			$8,006.230.00
Value of irrigated crops per acre cropped			$121.67
Finances:			
Net construction cost to end of fiscal year			$3,266,215.64
Per cent complete at end of fiscal year			93
Appropriated for fiscal year 1919, total			$303,500.00
Allotment for construction, fiscal year 1919			$178,500.00
Estimated per cent complete, June 30, 1919			96
Estimated gross construction cost to June 30, 1920			$3,460,000.00
Estimated per cent complete, June 30, 1920			98
Announced construction charges per acre			$52.00 to $64.00
Appropriation fiscal year 1918			$294,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation—			
Disbursements	$219,639.04		
Transfers	17,212.86		
		$236,851.90	
Registered liabilities chargeable to 1918 appropriation		30,090.14	
Contract obligations wholly covered by 1918 appropriation		16,050.00	
			282,992.04
Unencumbered balance July 1, 1918			11,007.96
Repayments:			
Value of construction water-right contracts			3,211,953.58
Construction charges—			
Accrued to end of fiscal year			830,631.66
Collected to end of fiscal year			[1] 809,845.11
Uncollected at end of fiscal year			20,786.55
Operation and maintenance charges (public notice)—			
Accrued to end of fiscal year			743,086.37
Collected to end of fiscal year			[2] 713,967.26
Uncollected at end of fiscal year			29,119.11

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[1] Includes $26,446.87 credit for existing works taken up on joint construction vouchers.

[2] Includes $1,045.34 credit for existing works taken up on joint construction vouchers.

Repayments—Continued.	
Water-rental charges—	
Accrued to end of fiscal year	$44,761.21
Collected to end of fiscal year	44,058.22
Uncollected at end of fiscal year	702.99
Power earnings—	
Accrued to end of fiscal year	1,869.20
Collected to end of fiscal year	1,869.20
Drainage:	
Estimated acreage damaged by seepage to end of fiscal year	10,000
(Drainage system being constructed by local drainage districts.)	
Estimated acreage protected by drains built to end of fiscal year.	40,000
Cost of drainage works to end of fiscal year (investigation only)	$11,418.80

TIETON UNIT.

Areas:			
Irrigable acreage when project is complete			32,000
Public land entered to end of fiscal year		2,037	
Public land open to entry at end of fiscal year		15	
State and railroad land		2,246	
Private land		27,702	
Acreage service could have supplied season of 1917			31,000
Estimated addition in fiscal year 1918			1,000
Estimated acreage service can supply July 1,1919			32,000
Acreage actually irrigated, season of 1917			25,400
Acreage cropped under irrigation, season of 1917			24,425
Crops:			
Value of irrigated crops, season of 1917			$1,777,595.00
Value of irrigated crops, per acre cropped			$72.80
Finances:			
Net construction cost to end of fiscal year			$3,197,775.19
Per cent complete at end of fiscal year			95
Appropriated for fiscal year 1919, total			$166,000.00
Allotment for construction, fiscal year 1919			$106,000.00
Estimated per cent complete June 30, 1919			99
Proposed appropriation, fiscal year 1910 for construction			$50,000.00
Estimated total construction cost to June 30, 1920			$3,365,410.00
Estimated per cent complete, June 30, 1920			100
Announced construction charges per acre			$93.00
Supplemental			$11.63
Appropriation, fiscal year 1918			$87,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$56,741.16		
Transfers	12,225.32		
		$68,966.48	
Registered liabilities chargeable to 1918 appropriation		4,580.91	
Contract obligations wholly covered by 1918 appropriation		4,239.00	
Estimated engineering expenses on contract work wholly covered by 1918 appropriation			77,786.39
Unencumbered balance July 1, 1918			9,213.61
Repayments:			
Value of construction, water-right contracts			2,893,969.58
Construction charges—			
Accrued to end of fiscal year			391,516.62
Collected to end of fiscal year			373,699.00
Uncollected at end of fiscal year			17,817.62

Repayments—Continued.	
Operation and maintenance charges (public notice)—	
Accrued to end of fiscal year	$256,374.19
Collected to end of fiscal year	233,215.46
Uncollected at end of fiscal year	23,158.73
Water-rental charges—	
Accrued to end of fiscal year	1,760.50
Collected to end of fiscal year	1,760.50
Drainage: Estimated acreage damaged by seepage to end of fiscal year.	100

STORAGE UNIT.

CONSTRUCTION DURING FISCAL YEAR.

Kachess Dam.—No construction was done at the dam site, but operation and maintenance of the structures were continued throughout the year.

Clealum Crib Dam.—Considerable repairs were made to the cribbing and wooden outlet works, replacing the decayed timbers caused by the fluctuations in the lake level. These cost about $6,600.

Keechelus Dam.—During the year riprapping of the upstream face of the dam and paving the outlet channel were completed; 1,960 cubic yards of riprap in the former and 1,776 square yards of paving in the latter were placed between June and December, 1917.

The abutment for the footbridge to the gate tower was constructed and the bridge, which was erected during the preceding fall and was resting on a temporary seat, was placed on its permanent abutment.

Concreting of the wing walls of the spillway, one at each end of the weir, was completed; 79 yards of concrete were placed.

Other minor construction at Keechelus consisted of the completion of the embankment at the north end of the dam, making the bond between spillway and dam, placing toe-drain outlets, cleaning the natural channel from the spillway to the old river bed, and installation of accessories to gate tower.

Clearing of the reservoir site was continued; approximately 350 acres were cleared during the year.

TIETON RESERVOIR.

Road construction.—The road from the mouth of Tieton River to camp No. 5 was greatly improved by widening and surfacing with gravel. The floods in December, 1917, necessitated the reconstruction of a portion of this road, which was either totally destroyed or greatly damaged. During the month of June the road from Rimrock to Clear Creek Dam, a distance of 9 miles, was improved preliminary to raising that structure 21 feet.

Camp construction.—The construction of a modern camp to accommodate 600 men and 150 families was completed. Just before the order to close down the work Rimrock was one of the most thriving communities in the Northwest. During the last Liberty loan campaign it went "over the top" before midnight of the first day, and oversubscribed its allotment by four times before the end of the drive.

The village had a pure water-supply system piped to each lot under fire-fighting pressure; a sewage system; electricity for power, lighting, and to some extent cooking; a central steam-heating plant for all the principal Government owned buildings and a number of the residences; a well-equipped hospital; a club house for gatherings of all sorts; bunkhouses for laborers with individual rooms where wanted, all electric lighted and steam heated; a dormitory; a modern mess house; well equipped shops, garages, and warehouses; and a mercantile store doing a thriving business.

Power system.—A flume carrying 200 second-feet and 3,200 feet long was constructed to power plant No. 1, which houses a temporary plant composed of hydraulic and electrical machinery gathered from various parts of the project.

Operation of this plant was started on September 12. In the spring the flume was extended 2,000 feet farther to the site of power plant No. 2, and the foundations of the latter completed.

Construction of permanent works consisted of the driving of Tieton tunnel 1,610 feet long and 21 feet in diameter. This will be used for the passage of flood waters during construction and later serve as an outlet for irrigation waters.

Logging and clearing of the borrow pit and reservoir area were continued throughout the year. About 300 acres were logged, 50 of which were also cleared. A portion of the logs were sawed into lumber, part of which was consumed for camp construction and part sold under contract.

BOARD MEETINGS.

Date.	Topic.	Personnel.
1917.		
Aug. 17	Tieton Dam	D. C. Henny, A. J. Wiley, Chas. H. Swigart.
Dec. 21	Tieton Reservoir outlet control	D. C. Henny, A. J. Wiley, J. L. Savage, J. M. Gaylord, Chas. H. Swigart (concurring).
Dec. 28	do	D. C. Henny, Chas. H. Swigart.
1918.		
Apr. 27	Tieton Dam	D. C. Henny, Chas. H. Swigart, C. E. Crownover, G. C. Finley.
July 10	do	Gen. W. L. Marshall, A. P. Davis, F. E. Weymouth, D. C. Henny, Chas. H. Swigart, C. E. Crownover.

SUNNYSIDE UNIT.

CONSTRUCTION DURING FISCAL YEAR.

The construction work on the Sunnyside unit consisted of work in connection with the completion of the pumping plants and distribution systems for the Snipes Mountain, Outlook, Grandview, and Prosser irrigation districts.

For the Snipes Mountain irrigation district the work consisted of redesign and alteration of the small unit which failed to develop the required efficiency as installed in the spring of 1917. The unit as modified was installed in March, 1918, and tested in April, 1918. The test disclosed that the unit was still below the required efficiency. Both units in the plant, together with the Hillcrest plant, have been operated continuously since March 31.

For the Outlook irrigation district both pumping units, although operated throughout the 1917 irrigation season, had failed to show the required efficiency and prior to the spring of 1918 the manufacturers redesigned the machines, making extensive alterations. The installation of the units as modified was completed and the plant placed in operation March 30, 1918, since which time it has been operated continuously. The official test of the large unit developed an efficiency considerably in excess of that guaranteed, but the small unit failed to show the desired efficiency.

For the Grandview irrigation district the hydraulic unit installed in 1917 was operated continuously until the close of the irrigation season of 1917. The Rocky Ford plant was completed and the motor-driven pumps installed at the Grandview pumping plant. The three units in this plant have been operated continuously since April 15, 1918.

For the Prosser irrigation district the principal work of construction during the year was in connection with the construction of the pumping plants and distribution system for the irrigation of 2,150 acres of land near Prosser, Wash. The landowners of this tract formed an irrigation district under the State law and contracted with the United States for the construction of the necessary irrigation works. The work of construction was started in January, 1918, and on June 30 was approximately 70 per cent completed. The work accomplished to June 30 consisted of the excavation of laterals and pipe trenches for the distribution system, construction of discharge lines and tail races for pumping plants, installation of pipe lines on the distribution system, and the hauling of the aggregate for concrete lining of laterals and construction of reinforced concrete power houses. The total results accomplished were 29,000 cubic yards of class 1 excavation, 5,000 cubic yards of class 3 excavation, 34,000 linear feet of inserted joint wood-stave pipe from 6 to 26 inches in diameter installed, 200 cubic yards of reinforced concrete placed on various small structures, and 1,000 cubic yards of aggregate hauled for concrete lining and power-house construction.

DRAINAGE.

The drainage system on the Sunnyside unit has been constructed, and is operated and maintained by drainage districts in accordance with the State law. Since 1912, 18 drains with a length of 70 miles have been completed and 4 more are under construction. Of the 70 miles of drains, 50 miles are open ditch and 20 miles are covered tile drains, from 4 to 20 inches diameter. The total excavation for drains built or under construction approximates 1,600,000 cubic yards, at a cost of $543,000, and affects 40,200 acres of land.

Of the 18 drains built, 11, serving 21,000 acres, discharge into Sulphur Creek wasteway, which serves the twofold purpose of a relief for the main canal and the main artery of the drainage system for the country between Outlook and Grandview.

BOARD MEETINGS.

Date.	Topic.	Personnel.
1917.		
July 20	Tieton Canal improvement and project area	D. C. Henny, R. K. Tiffany, G. C. Finley.
Aug. 15	Tieton Canal enlargement	A. J. Wiley, Chas. H. Swigart, R. K. Tiffany, G. C. Finley.
15	Kennewick extension	D. C. Henny, A. J. Wiley, Chas. H. Swigart, R. K. Tiffany.
16	Storage for Yakima Indian Reservation	D. C. Henny, R. K. Tiffany, A. J. Wiley, Chas. H. Swigart.

OPERATION AND MAINTENANCE.

From July 1, 1917, to the close of the 1917 irrigation season, October 31, the operation of the Sunnyside Canal and distribution system was continuous and without incident other than the usual routine. The maximum diversion from the river for the season of 1917 was 1,269 second-feet on July 21. The continued warm weather of July and August created a general demand for heavy delivery of water during those months and the warm, dry fall brought about an unusual use of water throughout September and October.

For the irrigation season of 1918, water was first turned into the canal on March 21. By April 1 the diversion was 380 second-feet. The open, mild winter of 1917–18, followed by a dry and early spring, resulted in much farm work having been accomplished by the opening of the irrigation season and this, coupled with a prospect of water shortage in late summer because of insufficient snow in the mountains, operated to create an early and general demand for heavy water delivery. The diversion from the river was rapidly increased until approximately 1,140 second-feet were being diverted, and for the remainder of the fiscal year an average diversion of 1,150 second-feet was maintained. There was some delay in water delivery on the Mabton Canal and a few laterals because of siphon and flume trouble, but in general the service was satisfactory throughout the project, including the several irrigation districts.

The maintenance work was done, for the most part, during the nonirrigation season and consisted of the work necessary to keep the canals in condition to carry the desired quantities of water, correction and prevention of erosion, removal of silt, strengthening of canal banks, clearing rights of way of weeds, maintenance of houses and grounds, and replacement and repair of structures. In addition, 3,500 linear feet of canal of 70 second-feet capacity were constructed, replacing a high wooden flume of 50 second-feet capacity on the Mabton Canal; 38 concrete measuring boxes and 11 steel and concrete turnouts were installed in the distribution system, and 35 deliveries to land first receiving water were installed.

On December 19 and again on December 31 the Yakima River reached extraordinary flood stage, exceeding all previously reached flood stages, except that of November, 1906. The flood of December 31 threatened to overtop the Sunnyside Canal bank for a distance of about 1,500 feet below the diversion dam. An emergency call by telephone brought to the scene farmers and business men of the valley to the number of 250, and with their help the canal bank was raised and protected with some 7,000 sacks of gravel. But for this prompt action several thousand second-feet of water would have flowed down the canal and damaged the canal and farms thereunder to the extent of many thousands of dollars.

Historical review, Sunnyside unit, Yakima project.

Item.	1913	1914	1915	1916	1917	1918
Acreage for which Service was prepared to supply water	80,607	81,306	81,807	89,253	97,176	98,537
Acreage irrigated	62,800	64,100	67,000	71,400	80,500	82,200
Number of farms irrigated	2,450	2,447	2,450	2,553	2,682	2,740
Miles of canal operated	525	525	525	572	590	597
Water diverted (acre-feet)	312,733	316,828	314,057	[1] 276,210	353,287	413,829
Water diverted to land (acre-feet)	194,725	211,902	203,397	180,413	234,662	287,395
Per acre of land irrigated (acre-feet)	3.101	3.310	3.035	2.527	3.008	3.496

[1] Shortage in supply of water available in river, Aug. 8 to Oct. 23, 1915.

SETTLEMENT AND DEVELOPMENT.

The increase in development for 1917 was greater than for several years previous, due largely to war prices and to the call for increased food production. Of the land for which water is available, 93,095 acres are entitled to receive water and bound to repay project costs, either by special contract, water-right application, or through contracts of irrigation districts. Only 2,538 acres of land for which water is available under public notice have not been covered by water-right application. More new settlers came to the project this year than for several years previous, and it is estimated that of the new development 50 per cent was due to new settlers and 50 per cent to the efforts of landowners already in the valley. The project office, with the assistance of various community organizations, carried on an active campaign to induce the cultivation of vacant lands, resulting in the cultivation through sale or lease of a considerable area of land owned by nonresidents.

Following the organization of the lands within the main Sunnyside unit as an irrigation district, negotiations were entered into between the directors of the district and officials of the Reclamation Service looking toward a contract by which the irrigation district would assume the obligation of payment of the project costs. A vote of the district, authorizing its execution, was had on December 11, 1917. The vote was 112 for, and 17 against. The development of land under the Sunnyside, Outlook, and Snipes Mountain irrigation districts continued at a satisfactory rate; about 1,000 acres of land under the Grandview district were placed in cultivation during the year. Prices for the land in these districts, which in 1916 ranged from $30 to $60 per acre, advanced during the past year to $50 to $100 an acre.

The war demand caused a difficult situation with reference to harvest labor, and farmers paid from $3 to $4 per day during the latter part of September, October, and early November for very inefficient help in harvesting potatoes, apples, corn silage, and other crops which matured during that period. The high schools were closed or operated on half time. The State Harvesters' League, with headquarters at Seattle, the Federal Labor Bureau, and various local organizations, by widespread publicity and appeals to all classes of people to assist so far as possible in the harvest work, aided materially in saving the crops. Any further considerable increase of crop production in the Yakima Valley will, however, be conditional upon the assurance of an adequate supply of harvest labor, as that is now the limiting factor in crop production. Notwithstanding the high cost of labor and building materials, there are many new farm houses, barns, silos, and other improvements in evidence on the project farms. Zillah and Grandview have constructed modern high-school buildings during the year. The chief building activities in the towns are evidenced in increased warehouse, storage, and shipping facilities.

The Northern Pacific Railway Co. during the year extended its Sunnyside branch from Grandview to Gibbon and built long passing and loading tracks, laying heavy steel thereon, so that it now has parallel lines throughout the length of the Yakima-Sunnyside project, vastly improving the facilities for handling the congested traffic through the district. Freight handled by the Northern Pacific Railway, originating in the Yakima Valley, increased from 27,000 carloads in 1916 to 34,000 carloads in 1917. This does not include gravel for road work, sugar beets hauled to the factory, or fruit or vinegar plants within the valley. Of this tonnage probably one-third, or 10,000 carloads, was produced in the Sunnyside district.

Settlement data, Sunnyside unit, Yakima project.

Item.	1914	1915	1916	1917	1918
Total number of farms on project	2,448	2,450	2,553	2,682	2,740
Population	6,900	7,270	7,844	8,000	8,255
Number of irrigated farms	2,448	2,450	2,553	2,682	2,740
Operated by owners or managers	1,912	1,910	1,898	1,744	1,942
Operated by tenants	536	540	655	938	798
Population	6,900	7,270	7,844	8,000	8,255
Number of towns	13	13	13	13	13
Population	5,300	5,460	5,268	5,350	5,550
Total population of towns and on farms	12,200	12,730	13,112	13,350	13,805
Number of public schools	34	34	34	35	37
Number of churches	30	30	30	30	30
Number of banks	9	9	9	9	9
Total capital stock	$260,000	$255,000	$309,573	$245,000	$277,500
Amount of deposits	$1,248,000	$1,028,679	$1,112,296	$1,896,341	$2,349,702
Number of depositors	3,000	5,848	5,674	6,640	7,375

PRINCIPAL CROPS.

The weather during the entire spring season of 1917 was very unfavorable for all crops. The precipitation during the winter was below normal, the spring was very dry, and this, coupled with cold and raw weather continuing throughout March and early April, delayed materially all farm work and resulted in very little plant growth of any kind. However, when the weather moderated about the middle of April and plant growth started, there were no killing frosts and rapid progress was thereafter made. Midsummer was extremely hot and dry, but this in the main operated for the benefit of the crops by overcoming the effect of the late spring. The fall weather was ideal for crops and harvest, and because of the scarcity of labor this condition was doubly welcome. The first killing frost was on October 17. In fine the season proved to be as profitable as if not more so than any experienced in the history of the project.

Alfalfa continues to be the largest crop in acreage grown. The average yield of 4.5 tons per acre is slightly less than normal, but the prevailing high prices and steady demand throughout the year made this crop very profitable, the average return of $90 per acre being the highest known. Despite the introduction of sugar beets on the project, with the consequent plowing under of alfalfa, the acreage in alfalfa increased 3,362 acres, or 12 per cent, as compared with 1916. Potatoes show a marked increase in acreage planted. The very high prices secured for the 1916 crop after January, 1917, encouraged planting and an increase of 1,620 acres, or 43 per cent, over the 1916 area was the result. The hot wind in summer operated, however, to reduce somewhat the average yield. By reason of the continued tendency to reduce the live stock on the project, the area planted to corn shows a marked decrease compared with 1916. The season, however, proved to be excellent for this crop and a better average yield or finer quality of corn was never grown on the project. The noteworthy feature of the 1917 crop was the introduction of sugar beets as one of the staple crops on the project. The successful campaign in the fall of 1916 for the necessary acreage to be planted to sugar beets in order to secure the erection of a sugar factory by the Utah-Idaho Sugar Co. at Yakima resulted in the planting of 1,976 acres of sugar beets under the Sunnyside Canal. Where a good stand was obtained and proper attention given the beets throughout the season, excellent results were obtained. The results of the past season can best be summed up by stating that they were sufficient to secure the contracting of 6,000 acres under the Sunnyside Canal for 1918, and the erection of a sugar factory at Sunnyside.

The total orchard area as compared with that of 1916 shows a reduction of 1,577 acres. The grubbing out of fillers and those orchards subject to frost has been continued and this, coupled with the fact that very little new orchard has been planted, explains the decreased area. The season of 1917 was the best season the orchardist has experienced in years. Although the cold, backward spring delayed materially the blossoming of all fruit trees, the absence of killing frosts after the trees were in bloom resulted in one of the heaviest yields of fruit in the valley. In addition ready sale was made of nearly all fruit as rapidly as it could be marketed at very good prices. For a time the scarcity of farm labor threatened the harvesting of the apple crop, but the unusually mild and dry fall overcame this.

The total crop return of $8,006,230 is about double that of 1916, which was heretofore the largest return in the history of the project. The high price of hay, coupled with the large yield and good prices for all kinds of fruit, is in the main responsible for this large return. Of this return 34 per cent was from fruit as compared with 32 per cent in 1916, 27 per cent in 1915, and 39.5 per cent in 1914. The return of $121.67 per acre cropped is not only the largest return ever had but is equal to or greater than the combined average return of any two preceding years.

Crop report, Sunnyside unit, Yakima project, Washington, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	31,678	Ton	143,551	4.5	$20.00	$2,871,020	$90.00
Apples	10,677	Pound	94,982.400	8,896	.02	1,899,650	177.92
Barley	764	Bushel	23,779	31	1.40	33.290	43.40
Beans	988	...do	18,706	19	5.60	104,754	106.40
Beets, sugar	1,976	Ton	19.760	10	7.00	138,320	70.00
Corn	5,796	Bushel	274,000	47	1.25	342,500	58.75
Corn ensilage	1,414	Ton	21,210	15	8.00	169,680	120.00
Corn fodder	1,260	...do	8,820	7	6.00	52,920	42.00
Fruits, small	339					50,850	150.00
Garden	1,311					183,540	140.00
Hay, other than alfalfa	1,209	Ton	3,627	3	22.00	79,795	66.00
Hops	122	Pound	186,200	1,526	.15	27,930	228.90
Melons	115					23,000	200.00
Oats	304	Bushel	13,452	44	1.00	13,450	44.00
Onions	88	...do	8,820	100	1.25	11,025	125.00
Pasture	4,031					100,775	25.00
Peaches	999	Pound	8,487,500	8,496	.025	212,188	212.40
Pears	1,481	...do	12,573,500	8,490	.035	439,970	297.15
Prunes	252	...do	3,798,525	15,073	.035	132,948	527.55
Potatoes	5,394	Bushel	1,252,333	232	.80	1,001,865	185.60
Wheat	2,919	...do	58,380	20	2.00	116,760	40.00
Less duplicated areas	7,314						
Total cropped	65,803	Total and average				8,006,230	121.67

		Area.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Irrigable area farms reported	80,500	2,720	72.64
Young orchard	1,055	Irrigated area farms reported	80,500	2,720	72.64
Young alfalfa	2,569	Under water-right applications	26,500	920	23.92
Houses and corrals	2,748	Under rental contracts	54,000	1,800	48.72
Irrigated without crop	7,892	Cropped area farms reported	65,803	2,720	59.37
Town-site areas	1,950				
Less duplicated areas	1,517				
Total irrigated	80,500				

TIETON UNIT.

CONSTRUCTION DURING FISCAL YEAR.

The program of raising the sides of the Tieton Canal was continued and 97 additional stations were completed. The work consisted of raising the sides of the segmental circular concrete canal section one foot and replacing the original concrete crossties with steel bar or channel crossties spaced 4 to 6 feet. The work was done by Government forces during the months of August to November inclusive.

OPERATION AND MAINTENANCE.

At the end of the fiscal year about 26,500 acres of land were receiving water. Delivery is made on a definite rotation basis over the entire project. About 12,000 acres are served on a schedule of 7 days on and 14 days off, and the remainder on a schedule of 7 days on and 7 days off. The normal delivery is on the basis of a continuous flow of 1 second-foot to 140 acres, but this is necessarily modified to meet local conditions. There were no serious interruptions of water service during the irrigation season, but during July and August, owing to extraordinarily hot weather, the water supply was not quite sufficient to adequately meet irrigation needs. The enlargement made in the fall of 1917 permitted an increased delivery of about 15 second-feet, which has done much to relieve the situation during the latter half of the fiscal year.

Maintenance work in the fall of 1917 was handicapped by reason of the labor shortage and as a consequence there was an unusual amount of cleaning and repair work in the spring of 1918.

A new patrol house was built in the spring of 1918 on the Yakima Ridge near the junction of laterals K and L. The location of a man at this point has improved the service considerably by reason of better regulation of the flow in these two laterals.

Historical review, Tieton unit, Yakima project.

Item.	1913	1914	1916	1916	1917	1918[1]
Acreage for which service was prepared to supply water	34,000	34,000	34,000	30,000	31,000	32,000
Acreage irrigated	18,750	20,600	22,000	23,000	25,400	26,000
Miles of canal operated	335	335	335	335	335	335
Water diverted (acre-feet)	59,500	67,790	62,000	74,936	80,377	88,000
Water served to land (acre-feet)	42,539	43,099	40,376	49,412	57,318	61,000
Per acre of land irrigated (acre-feet)	2.27	2.09	1.83	2.15	2.26	2.4

[1] Estimated.

SETTLEMENT.

The combination of good crops with good prices in the fall of 1917 has afforded, for the first time, somewhat general relief of the serious financial stress to which most of the settlers on the Tieton unit were subjected during the early years of project development. The extension of the Northern Pacific Railway to Tieton and of the Yakima Valley Transportation Co.'s line to Henrybro has brought every farm on the project within 4 or 5 miles of a shipping point. Labor shortage and Government limitations on bond issues have prevented the carrying out of road construction on a large scale, but nevertheless several miles of macadam or gravel road have been built. High prices of hay and feed have resulted in the culling of poor stock from all dairy herds and complete dispersal of a few. New homes, barns, silos, and other improvements are much in evidence. There is a decided tendency on the part of nonresident owners to sell at reasonable prices, and it is believed that as soon as the war is over settlement will proceed more rapidly than ever before.

Settlement data, Tieton unit, Yakima project.

Item.	1914	1915	1916	1917	1918
Total number of farms	1,000	1,200	1,300	1,400	1,400
Population	1,916	2,100	2,250	2,150	2,150
Number of irrigated farms	1,000	1,200	1,300	1,400	1,400
Population	1,916	2,100	2,250	2,150	2,150
Number of towns	7	7	7	7	7
Population	18,000	19,000	20,000	20,500	21,850
Total population	19,916	21,100	22,250	22,650	24,000
Number of public schools	10	10	10	10	10
Number of churches	3	3	3	3	3

PRINCIPAL CROPS.

The principal crops planted in 1918 vary from the average only in the introduction of a larger acreage of grain and a small acreage of sugar beets. Total crop returns for 1917 were $1,777,595, an average of $72.80 per acre cropped. Alfalfa continues to be the most important crop, both as to acreage and gross returns, about 40 per cent of the entire irrigated area being planted to this crop. Apples are second in importance, comprising about 20 per cent of the total area. Nearly all of the orchards are now planted to alfalfa as a cover crop. The war demand stimulated the planting of wheat, but the yield was unsatisfactory, due to the fact that a large proportion was late seeding on land improperly prepared.

Crop report, Tieton unit, Yakima project, Washington, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	10,529	Ton	32,244	3.1	$18.00	$580,392	$55.10
Apples	5,275	Pound	21,234,350	4,025	.02	424,687	80.50
Barley	781	Bushel	16,510	21.2	1.30	21,463	27.50
Beans	774	...do	12,457	16.1	6.00	74,742	96.55
Beets, sugar	247	Ton	2,103	8.5	7.00	14,721	59.60
Clover hay	185	...do	275	1.5	15.00	4,125	22.30
Corn	603	Bushel	22,468	37.3	1.25	28,085	46.55
Corn ensilage	188	Ton	1,948	10.4	7.50	14,610	77.70
Corn fodder	60	...do	211	3.5	5.00	1,055	17.60
Fruits, small	47	Pound	146,892	3,125	.07	10,282	218.80
Garden	279	Acre	279	....	125.00	34,875	125.00
Hay, except above	544	Ton	813	1.5	15.00	12,195	22.40
Hops	324	Pound	292,000	900	.20	58,400	180.25
Oats	604	Bushel	19,313	32	.90	17,382	28.80
Onions	82	...do	12,123	148	1.75	21,215	258.70
Pasture	1,224	Acre	1,224	....	25.00	30,600	25.00
Peaches	362	Pound	1,345,400	3,716	.025	33,635	92.90
Pears	674	...do	1,747,480	2,593	.02	34,950	51.85
Potatoes	1,636	Bushel	284,275	174	.75	213,206	130.30
Wheat	3,912	...do	81,653	20.9	1.80	146,975	37.60
Less duplicated areas	3,905	....	....	....	....	....	....
Total cropped	24,425	Total and average				1,777,595	72.80

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Total irrigable area farms reported	28,500	1,190	85.2
Young orchard	1,520	Total irrigated area farms reported	25,400	1,190	75.9
Young alfalfa	689	Under water right applications	25,288	1,179	75.6
Irrigated without crop	144	Under rental contracts	112	11	.3
Miscellaneous	437	Total cropped area farms reported	24,425	1,190	73.1
Less duplicated areas	1,815				
Total irrigated	25,400				

PUBLIC NOTICES AND ORDERS.

SUNNYSIDE UNIT.

PUBLIC NOTICE, APRIL 4, 1918.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charges for the irrigation season of 1918 and thereafter until further notice against all lands of the Sunnyside

unit, Yakima project, Washington, under public notice, shall be as hereinafter stated.

2. **Classification of lands.**—For the purpose of equitably determining the operation and maintenance charges, the lands of the Sunnyside unit have been divided by the Sunnyside Valley irrigation district into three classes, according to water requirements—viz, A, B, and C—and a map showing such classification is on file in the office of the project manager and in the office of the irrigation district.

3. **Operation and maintenance charges.**—Each acre of irrigable land, whether water is used thereon or not, shall be charged with a minimum operation and maintenance charge of $1.25, which will permit delivery of not more than the following amounts per irrigable acre: To lands of class A, 2 acre-feet; to lands of class B, 2½ acre-feet; to lands of class C, 3 acre-feet. For additional water above the foregoing amounts, the rate shall be 50 cents per acre-foot: *Provided*, That for newly reclaimed lands no charge will be made for water actually needed in excess of the amount covered by a charge of $2 per irrigable acre at the said rates.

4. **Time of payment.**—All operation and maintenance charges are due and payable annually on March 1 following the irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15 in any year, or where water-right application is made after August 1 in any year for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

E. C. BRADLEY,
Assistant to the Secretary of the Interior.

PUBLIC NOTICE, MAY 6, 1918.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), public notice for the Sunnyside unit of the Yakima project, Washington, is hereby issued, as follows:

2. **Lands for which water will be furnished.**—Upon proper application being made therefor, water will be furnished under said project in the irrigation season of 1918, and thereafter, for the irrigable lands shown on a list of lands amendatory of the farm unit plats of the following townships, which plats were approved by the department June 23, 1915, to wit: T. 11 N., R. 20 E., W. M.; T. 10–11 N., R. 21 E., W. M.; T. 8–9–10 N., R. 22 E., W. M.; T. 8–9–10 N., R. 23 E., W. M.; T. 8–9 N., R. 24 E., W. M.; T. 9 N., R. 25 E., W. M. Said amendatory list was approved by the department on the date of this notice. A copy of the amendatory list and of each of said plats is on file in the office of the project manager, United States Reclamation Service, and in the local land office at Yakima, Wash. A portion of the lands hereunder are above gravity flow from the system of the Sunnyside unit and entrymen and landowners must assume all responsibility for raising water from said system to the land to be irrigated, which responsibility shall in future affect the charges to be paid for water rights under said unit. Said amendatory list shows

all changes in the irrigable areas heretofore opened to irrigation, as well as the land now opened to irrigation under this public notice.

3. **Limit of area for which water right may be secured.**—The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such lands, is fixed as shown upon the plats for the several farm units. The maximum limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each landowner.

4. **Application for water right.**—All water-right applications must be made to the project manager, United States Reclamation Service, Yakima, Wash., upon forms provided for that purpose, and may be made on and after the date hereof.

5. **Classes of charges for water rights.**—The water-right charges are of two kinds, to wit: (1) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge; and (2) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

6. **Construction charges.**—The construction charges shall be of two classes, to wit: $52 and $75 per acre of irrigable land.

(*a*) Water-right applications will be received for the irrigable lands within the following-described legal subdivisions as shown on the list referred to in paragraph 2 hereof at the rate of $75 per acre of irrigable land.

T. 9 N., R. 22 E.—SW. ¼ SE. ¼, SE. ¼ NE. ¼, and the SE. ¼ SE. ¼, section 12; section 13; SW. ¼ SW. ¼, SW. ¼ SE. ¼, and the SE. ¼ SE. ¼, section 23; lot 4 of section 26.

T. 9 N., R. 23 E.—Lot 2 of section 18.

(*b*) Water-right applications will be received for the irrigable lands as shown on the list referred to in paragraph 2, not included in subdivision (*a*) hereof, at the rate of $52 per acre of irrigable land.

(*c*) For lands that were on or before August 13, 1914, subjected by contract or otherwise to the provisions of the reclamation law, said construction charge shall be paid in 10 equal annual installments, the first of which shall be paid at the time of filing water-right application, and subsequent installments shall be due and payable December 1 of each year thereafter: *Provided, however,* That if water-right application subject to the provisions of said reclamation extension act, or an acceptance of the provisions of said act, be filed within six months from the date of this notice, said construction charge shall be payable in 20 installments, the first of which shall become due and payable on December 1 following the date of water-right application, and subsequent installments on December 1 of each year thereafter; in which event the first 4 installments shall each be 2 per cent, the next 2 installments each 4 per cent, and the next 14 each 6 per cent of the total construction charge.

(*d*) For the remaining lands an initial payment of 5 per cent of the construction charge shall be made at the time of filing water-right application, and the remainder of the construction charge shall be paid in 15 annual installments, the first 5 of which shall each be 5 per cent and the remainder each 7 per cent of the total construction charge. The first of said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

7. **Increased construction charges in certain cases.**—In all cases where water-right application for lands in private ownership or for lands under entry not subject to the reclamation law shall not be made within one year from the date of this notice, the construction charge for such lands shall be increased 5 per cent each year until such application is made and an initial installment paid.

8. **Operation and maintenance charges.**—The operation and maintenance charges affecting the lands covered by this notice are announced by public notice for the Sunnyside unit, Yakima project, dated April 4, 1918.

9. **Contract with irrigation district.**—If, however, a contract for cooperation under the Federal reclamation laws and the State irrigation district statutes shall be made between the United States and the Sunnyside Valley irrigation district, providing that the district shall assume the responsibility for paying the United States for all reclamation charges due from lands under the project, no water-right application shall thereafter be made to the United States under this notice, nor shall the charges increase under paragraph 7 hereof for failure to make such application, and the construction and operation and maintenance charges described herein shall not be paid to the United States by the landowner or entryman but to the district, and shall be paid in the manner and upon the dates provided by the said State statutes and in accordance with the said contract, anything hereinbefore to the contrary notwithstanding.

E. C. BRADLEY,
Assistant to the Secretary of the Interior.

TIETON UNIT.

PUBLIC NOTICE, APRIL 12, 1918.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charges for the irrigation season of 1918 and thereafter until further notice against all lands of the Tieton unit, Yakima project, Washington, under public notice, will be as follows: For all water delivered between June 20 and August 31, inclusive, a charge of $1 per acre-foot will be made; and for all water delivered at other times during the irrigation season a charge of 60 cents per acre-foot will be made: *Provided,* That a minimum charge of $1.25 per irrigable acre will be made whether water is used or not, which minimum amount when paid will be credited upon the account for water delivered at the above acre-foot rates. All operation and maintenance charges are due and payable annually on March 1 following the irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15 in any year, or where water-right application is made after August 1 in any year for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

E. C. BRADLEY,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Yakima storage unit, June 30, 1918.

Cash			$5,972.22
Inventory of stock on hand			241,081.95
Accounts receivable			257,925.07
Construction work contracted			26,151.43
Construction cost		$3,744,003.18	
Less construction revenue earnings	$134,391.42		
Less cost adjustments	2,547.01		
		136,938.43	
			3,607,064.75
Operation and maintenance work			20,165.96
Total			4,158,361.38
Accounts payable			61,411.61
Contingent obligations			31,944.25
Reserves for repayment to reclamation fund of cost of project			688,395.92
Capital investment:			
Disbursement, transfer and joint construction vouchers received		$4,057,231.66	
Collection, transfer, refund, and joint construction vouchers issued		680,622.06	
Net investment			3,376,609.60
Total			4,158,361.38

Feature costs of Yakima storage unit, to June 30, 1918.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys:		
Clealum		$33,141.56
Tieton Reservoir	[1] $641.52	19,923.46
Reservoir reconnoissance		2,927.92
Hydrographic surveys		5,460.48
Hydrographic investigations		29,303.43
High line		2,700.12
American River	1,998.38	1,998.38
	1,356.86	95,455.35
Storage works:		
Preliminary and general work—		
Kachess	32.52	25,077.12
Keechelus	4,065.86	128,102.30
Clealum	1,366.18	128,419.35
Tieton Reservoir	[1] 6,356.63	16,198.17
Dam—		
Kachess	[1] 16,763.31	410,349.63
Keechelus	[1] 20,515.77	1,207,371.95
Tieton Reservoir	62,618.23	62,618.23
Clear Creek	22,396.81	22,396.81
Spillway—		
Kachess		35,656.58
Keechelus	[1] 3,128.91	120,807.50
Clear Creek	1,764.77	1,764.77
Tunnels—		
Keechelus	[1] 4,516.17	116,344.84
Tieton Reservoir	218,981.97	218,981.97
Bridges—Keechelus	[1] 284.45	7,539.10
Clearing and logging, reservoir area—		
Kachess		187,200.48
Keechelus	93,347.92	207,913.78
Tieton Reservoir	89,248.95	89,248.95
	442,257.97	2,985,991.53
Permanent improvements and land:		
Buildings—		
Kachess		2,667.90
Keechelus	82.25	2,635.64
Clealum	500.17	500.17
Roads—		
Kachess		59.90
Keechelus	[1] 560.07	16,008.96
Tieton Reservoir	85,755.24	128,095.44
Bridges—		
Keechelus	[1] 71.11	3,729.94
Tieton Reservoir	10,139.77	15,030.54
	95,846.25	168,728.49

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[1] Deduct.

Feature costs of Yakima storage unit, to June 30, 1918—Continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Telephone system:		
Telephone lines—		
Kachess	....	$1,008.07
Keechelus	$585.32	3,246.61
Tieton Reservoir	342.68	1,125.72
	928.00	5,380.40
Balance in plant accounts	263,649.61	393,224.83
Unadjusted clearing accounts	76,268.83	95,222.58
Gross construction cost to June 30, 1918	880,307.52	3,744,003.18
Less revenues earned during construction period:		
Rental of buildings	2,196.57	29,066.27
Rental of grazing and farming lands	200.00	251.00
Net power earnings (prior to public notice)	....	1,766.13
Rentals of irrigation water	....	4,305.00
Rentals of telephones and tolls	[1] 7.60	26.60
Other revenues, unclassified	33,396.78	100,742.55
Profit on hospital operation	[1] 1,706.85	358.47
Other profits on operations unclassified	[1] 32,618.23	422.41
	1,460.67	136,938.43
Net cost	....	3,607,064.75

[1] Deduct decreases due to transfer of profits direct to work with the exception of telephone rentals.

Statement of cost by calendar years, Yakima storage unit.

Year ending Dec. 31—	Construction.	Year ending Dec. 31—	Construction.
1910	$686,578.84	1917	$412,639.78
1911	300,056.75	January to June 30, 1918	211,388.99
1912	[1] 262,541.90	Plant accounts on June 30, 1918	393,224.83
1913	428,742.35	Unadjusted clearing accounts on June 30, 1918	95,222.58
1914	439,333.12		
1915	479,918.70		
1916	559,439.14	Total	3,744,003.18

[1] Deduct apparent decrease due to transfer Bumping Lake construction costs to Yakima-Tieton unit.

Statement of cost by fiscal years, Yakima storage unit.

Year ending June 30—	Construction.	Year ending June 30—	Construction.
1910	$443,807.26	1917	$542,432.48
1911	337,361.17	1918	880,307.52
1912	[1] 214,039.11	Plant accounts on June 30, 1917	129,575.22
1913	284,545.65	Unadjusted clearing accounts on June 30, 1917	18,953.75
1914	446,695.02		
1915	500,188.76		
1916	374,175.46	Total	3,744,003.18

[1] Deduct apparent decrease due to transfer Bumping Lake construction costs to Yakima-Tieton unit.

Estimated cost of contemplated work, Yakima storage unit, during fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Storage works:		
Keechelus Reservoir—		
Preliminary general work	$2,300	
Dam	450	
Outlet works	6,650	
Spillway	1,500	
Clearing, logging	63,000	
Clear Creek Dam	10,000	
Tieton Reservoir: Preliminary and general work	10,000	
Total		93,900

Operating costs and revenues, Yakima storage unit, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works	$4,106.64	$6,159.96	$10,266.60	$8,066.39	$12,099.57	$20,165.96

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$21,310.20	$21,721.57
Total	21,310.20	21,721.57
Difference (excess)	11,043.60	1,555.61

Project balance sheet, Yakima-Sunnyside unit, June 30, 1918.

Cash			$5,363.18
Inventory of stock on hand			31,286.00
Accounts receivable			2,432,580.50
Construction work contracted			23,113.35
Construction cost		$3,282,141.62	
Less construction revenue earnings	$14,947.71		
Less cost adjustments	978.27		
		15,925.98	
			3,266,215.64
Operation and maintenance cost		863,006.03	
Less operation and maintenance revenue earnings		52,955.37	
			810,050.66
Total			6,568,609.33
Accounts payable			34,262.07
Contingent obligations			28,473.13
Reserves for repayment to reclamation fund of cost of project			3,957,687.84
Capital investment:			
Disbursement, transfer, and joint construction vouchers received		$4,292,203.23	
Collection, transfer, refund, and joint construction vouchers issued		1,744,016.94	
Net investment			2,548,186.29
Total			6,568,609.33

Feature costs of Yakima-Sunnyside unit to June 30, 1918.

Features.	Costs.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys	$4,336.10	$60,698.94
Pumping for irrigation:		
Snipes Mountain irrigation district	13.59	54,684.67
Outlook irrigation district	4,851.98	97,638.83
Grandview irrigation district	23,591.21	100,103.76
Prosser irrigation district	74,732.46	74,732.46
	103,189.24	327,159.72
Canal system: Main Canal	[1] 10,349.27	1,681,694.68
Lateral system:		
General gravity system		727,141.82
Sunnyside irrigation district	[1] 67.55	108,705.02
Snipes Mountain irrigation district	[1] 15.35	35,499.64
Outlook irrigation district		108,034.95
Grandview irrigation district	1,679.58	82,428.69
Prosser irrigation district	25,776.32	25,776.32
Supplemental construction		2,606.40
	27,373.00	1,090,192.84
Drainage system: Investigation		11,418.80
Farm units		22,462.15
Permanent improvements: Buildings and grounds		36,128.55
Telephone system		22,412.57
Plant accounts	1,839.12	11,823.01
Operation and maintenance charges transferred to and compounded with construction charges	4,262.59	18,150.36
Gross construction cost to June 30, 1918	130,650.78	3,282,141.62
Less revenues earned during construction period:		
Rental of buildings		3,924.09
Contractors' freight refunds	63.99	11,023.62
Profit on hospital operations	[1] 331.04	978.27
Total revenues	[1] 267.05	15,925.98
Net cost of construction of project to June 30, 1918		3,266,215.64

[1] Deduct.

Statement of cost by calendar years, Yakima-Sunnyside unit.

Year ending December 31—	Construction.	Operation and maintenance under public notice.	Total cost.
1907	$550,161.00	$45,438.41	$595,599.41
1908	244,100.05	47,592.06	291,692.11
1909	174,339.32	49,997.52	224,336.84
1910	642,867.08	82,223.95	725,091.03
1911	604,636.56	83,252.51	687,889.07
1912	153,779.92	86,480.45	240,260.37
1913	14,806.80	83,958.92	98,765.72
1914	87,471.24	78,709.20	166,180.44
1915	398,278.84	76,075.81	474,354.65
1916	133,273.75	74,647.80	207,921.55
1917	156,093.91	107,070.47	263,164.38
To June 30, 1918	107,903.74	61,758.97	169,662.71
Supplemental	2,606.40		2,606.40
Plant accounts	11,823.01		11,823.01
Undistributed expenses		5,761.29	5,761.29
Total	3,282,141.62	868,006.03	4,145,147.65

Statement of cost by fiscal years, Yakima-Sunnyside unit.

Year ending June 30—	Construction.	Operation and maintenance under public notice.	Total cost.
1907	$284,355.48	$30,971.13	$315,326.61
1908	237,327.31	49,221.16	286,548.47
1909	289,040.64	49,453.67	338,494.31
1910	550,533.44	64,811.50	615,344.94
1911	597,597.57	86,437.82	684,035.39
1912	385,810.24	95,541.15	481,351.39
1913	38,163.16	66,256.68	104,419.84
1914	13,720.41	89,111.28	102,831.69
1915	367,830.51	66,036.05	433,866.56
1916	157,381.50	68,353.60	225,735.10
1917	217,140.29	83,980.23	301,120.52
1918	130,650.78	107,749.50	238,400.28
Supplemental	2,606.40		2,606.40
Plant accounts on June 30, 1917	9,983.89		9,983.89
Undistributed expenses on June 30, 1917		5,082.26	5,082.26
Total	3,282,141.62	863,006.03	4,145,147.65

Estimated cost of contemplated work, Yakima-Sunnyside unit, during fiscal year 1919.

Principal feature.	Estimated cost during fiscal year 1919.	
	Sub feature.	Principal feature.
Pumping for irrigation: Prosser irrigation district		$5,000
Lateral system:		
Prosser irrigation district	$15,000	
Granger irrigation district	90,000	
		105,000
Operation and maintenance under public notice		115,000
Reimbursable accounts:		1,500
Plant and equipment		7,000
Total estimated cost		233,500

Operating costs and revenues, Yakima-Sunnyside unit, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works (proportion of cost)	$2,546.06	$2,525.94	$5,072.00	$6,465.67	$3,067.48	$9,533.15
Canal system:						
Diversion dam and headworks	819.64	367.30	1,186.94	2,779.35	3,868.95	6,648.30
Main and branch canals	12,985.65	49,947.30	62,932.95	151,441.25	337,697.10	489,138.35
	13,805.29	50,314.60	64,119.89	154,220.60	341,566.05	495,786.65
Lateral system: Laterals and wasteways	13,845.73	28,295.44	42,141.17	122,483.25	247,592.05	370,075.30
Undistributed expenses:						
Storage, operation, and maintenance		649.14	649.14	4,632.23	1,099.17	5,731.40
Clearing accounts		29.89	29.89		29.89	29.89
Gross cost		679.03	679.03	4,632.23	1,129.06	5,761.29
	30,197.08	81,815.01	112,012.09	287,801.75	593,354.64	881,156.39
Less operation and maintenance charges transferred to and compounded with construction charges			[1] 4,262.59			[1] 18,150.36
Net cost			107,749.50			863,006.03

[1] Deduct.

Operating costs and revenues, Yakima-Sunnyside unit, to June 30, 1918—Continued.

REVENUE.

Item.	Fiscal year, 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$80,905.77	$743,086.37
Operation and maintenance charges paid in advance by water-right applicants	[1] 338.83	288.39
Operation and maintenance charges paid and forfeited by water-right applicants	38.00	88.92
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	2,799.75	10,278.38
Rental of land and buildings during operating period	2,225.24	5,067.74
Rentals of power and light during operating period		1,869.20
Rentals of irrigation water	2,586.83	44,761.21
Rentals of telephone and tolls during operating period	11.40	13.15
Other revenues unclassified, earned during operating period	34.00	1,244.07
Discount allowed on operation and maintenance charges accrued on contracts with water-right applicants	[1] 1,058.72	[1] 2,715.29
Total	87,203.44	803,982.14
Difference (deficit)	20,546.06	59,023.89

[1] Deduct.

Project balance sheet, Yakima-Tieton unit, June 30, 1918.

Inventory of stock on hand			$3,207.62
Accounts receivable			2,543,429.31
Construction work contracted			4,239.00
Construction cost		$3,215,409.56	
Less construction revenue earnings	$14,968.08		
Less cost adjustments	2,666.29		
		17,634.37	
			3,197,775.19
Operation and maintenance cost		273,092.49	
Less operation and maintenance revenue earnings		8,611.88	
			264,480.61
Total			6,013,131.73
Accounts payable			4,631.89
Contingent obligations			4,239.00
Reserves for repayment to reclamation fund of cost of project			3,156,667.55
Capital investment:			
Disbursement, transfer, and joint construction vouchers received		$3,873,108.69	
Collection, transfer, refund, and joint construction vouchers issued		1,025,515.40	
Net investment			2,847,593.29
Total			6,013,131.73

Feature costs of Yakima-Tieton unit to June 30, 1918.

Principal feature.	Costs.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and survey		$69,694.56
Storage works:		
Bumping Lake Dam		550,837.42
Clear Creek Dam		84,542.78
Canal system:		
Headworks		14,937.15
Tunnels		397,100.73
Main canal	$20,848.93	687,396.59
Wasteways		57,181.22
Culverts and drains		22,453.97
Lateral system:		
Headworks and diversion dams		26,958.20
Laterals and sublaterals	[1] 8,837.08	855,886.93
Flumes		108,390.45
Bridges		5,562.36
Drops, chutes, checks, and turnouts		77,442.46
Siphons		14,175.95
Wasteways		11,067.21
Culverts and drains		54,226.07

[1] Deduct.

Feature costs of Yakima-Tieton unit to June 30, 1918—Continued.

Principal feature.	Cost.	
	Fiscal year 1918.	Total to June 1918.
Permanent improvements and lands:		
Buildings and grounds		$41,943.95
Roads		59,573.55
Real estate		2,768.60
Telephone system		25,148.78
Operation and maintenance during construction		10,208.54
Operation and maintenance charges transferred to and compounded with construction charges	$3,123.65	37,912.09
Total, fiscal year	15,135.50	
Gross construction cost to June 30, 1918		3,215,409.56
Less revenues earned during construction period:		
Rentals of buildings		4,827.35
Rentals of irrigating water		3,526.50
Contractors' freight refunds		5,092.12
Other revenues, unclassified		1,522.11
Hospital operations, profit	170.80	2,666.29
	170.80	17,634.37
Net cost of construction of project to June 30, 1918		3,197,775.19

Statement of cost by calendar years, Yakima-Tieton unit.

Year ending Dec. 31—	Construction.	Operation and maintenance.			Total costs.
		During construction.	Under public notice.	Total.	
1907	$174,725.75				$174,725.75
1908	478,025.00				478,025.00
1909	631,275.00				631,275.00
1910	587,278.00	$10,208.54		$10,208.54	597,486.54
1911	928,785.63		$22,003.53	22,003.53	950,789.16
1912	220,689.90		39,355.11	39,355.11	260,045.01
1913	22,395.00		43,857.57	43,857.57	66,252.57
1914	77,103.34		41,174.81	41,174.81	118,278.15
1915	38,776.09		7,159.66	7,159.66	45,935.75
1916	25,005.94		36,335.43	36,335.43	61,341.37
1917	20,592.52		41,652.66	41,652.66	62,245.18
6 months, 1918	548.85		35,547.38	35,547.38	36,096.23
Plant accounts			6,006.34	6,006.34	6,006.34
Gross cost	3,205,201.02	10,208.54	273,092.49	283,301.03	3,488,502.05

Statement of cost by fiscal years, Yakima-Tieton unit.

Year ending June 30—	Construction.	Operation and maintenance.			Total cost.
		During construction.	Under public notice.	Total.	
1907	$177,018.59				$177,018.59
1908	478,256.92				478,256.92
1909	631,056.66				631,056.66
1910	584,647.91	$10,208.54		$10,208.54	594,856.45
1911	906,776.57		$16,093.92	16,093.92	922,870.49
1912	218,372.47		26,447.16	26,447.16	244,819.63
1913	22,032.06		41,215.75	41,215.75	63,247.81
1914	36,817.09		40,966.73	40,966.73	77,783.82
1915	88,959.11		19,643.62	19,643.62	108,602.73
1916	15,485.55		28,183.90	28,183.90	43,669.45
1917	30,642.59		38,284.56	38,284.56	68,927.15
1918	15,135.50		56,250.51	56,250.51	71,386.01
Plant account			6,006.34	6,006.34	6,006.34
Gross cost	3,205,201.02	10,208.54	273,092.49	283,301.03	3,488,502.05

Estimated cost of contemplated work, Yakima-Tieton unit, during fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919.
Canal system: Tieton main canal, concrete lining	$100,000
Operation and maintenance under public notice	64,000
Messes and hospitals	1,000
Plant and equipment	5,000
Total estimated cost	170,000

Operating costs and revenues, Yakima-Tieton unit, to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works: Proportion of operation and maintenance cost	$1,948.58	$1,793.00	$3,741.58	$9,695.45	$3,603.67	$13,299.12
Canal system: Main canal	2,356.99	1,701.17	4,058.16	16,768.06	23,311.69	40,079.75
Lateral system:						
Main laterals	6,960.16	20,210.49	27,170.65	73,513.82	121,382.86	194,896.68
Sublaterals	2,596.99	17,086.36	19,683.35	2,596.99	34,136.18	36,733.17
Undistributed expenses:						
Buildings	....	935.17	935.17	....	12,634.60	12,634.60
Highways	....	....	....	....	3,569.67	3,569.67
Real estate	....	3,785.25	3,785.25	....	3,785.25	3,785.25
Plant accounts	....	[1] 2,411.41	[1] 2,411.41	....	6,006.34	6,006.34
	13,862.72	43,100.03	56,962.75	102,574.32	208,430.26	311,004.58
Less unpaid operation and maintenance charges added to construction cost	....	....	[1] 3,123.65	....	....	[1] 37,912.09
	....	....	53,839.10	....	....	273,092.49

[1] Deduct.

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$50,857.24	$256,374.19
Operation and maintenance charges paid in advance by water-right applicants	[1] 325.30	72.11
Operation and maintenance charges paid and forfeited by water-right applicants	10.50	22.50
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	1,504.86	2,185.20
Rental of land and buildings during operating period	1,425.40	6,837.92
Rentals of power and light during operating period	....	....
Rentals of irrigation water	740.75	1,760.50
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants	[1] 1,590.37	[1] 3,815.49
Total	52,623.08	263,436.93
Difference deficit [2]	....	9,655.56

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[1] Deduct.

[2] Costs include period Jan. 1 to June 30, 1918, while accruals include charges to and including the year 1917 only.

WYOMING, SHOSHONE PROJECT.

GEORGE O. SANFORD, project manager, Powell, Wyo.

LOCATION.

Counties: Park and Big Horn.

Townships: 52 to 58 N., Rs. 97 to 104 W., sixth principal meridian.

Railroad: Chicago, Burlington & Quincy.

Railroad stations and estimated population June 30, 1918: Cody, 1,035; [1] Corbett: Deaver, 200; [2] Ralston; Powell, 650; Garland, 50; [1] Mantua and [1] Frannie, Wyo.

WATER SUPPLY.

Source of water supply: Shoshone River.

Area of drainage basin: 1,380 square miles.

Annual run-off in acre-feet: Shoshone River near Cody (1,380 square miles), 1903–1917, maximum, 1,420,000; minimum, 846,400; mean, 1,132,500.

AGRICULTURE AND CLIMATIC CONDITIONS.

Area for which service is prepared to deliver water, season 1918: 55,407 acres.

Works constructed for seventh unit, but not open to entry: 8,100 acres.

Area under water-right applications, season of 1918: 48,761 acres.

Area under rental contract, season 1918: 440 acres.

Length of irrigating season: From April 10 to November 1.

Average elevation of irrigable area: 4,500 feet above sea level.

Rainfall on irrigable area: 1907–1917, average, 5.98 inches; 1917, 6.95 inches.

Range of temperature on irrigable area: −31° to 101° F.

Character of soil of irrigable area: Light sandy and clay loams.

Principal products: Alfalfa, grain, sugar beets, vegetables, cattle, hogs, and dairy products.

Principal markets: Omaha, Nebr.; Kansas City, Mo.; Chicago, Ill.; Denver, Colo.; Billings, Mont.; and local.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders relating thereto: February 10, March 9, August 31, 1917; April 1, 1918.

Location of lands opened: Tps. 54 to 56 N., Rs. 98 to 100 W., sixth principal meridian.

Limit of area of farm units: Public, 80 acres; private, 160.

Duty of water: 2 acre-feet per acre per annum at the farm.

Building charge per acre of irrigable land: $57 on first unit; $58 on second unit; $59 on third, fourth, and fifth units; $66 for sixth unit.

Annual operation and maintenance charge for 1918: A minimum charge of $1 per irrigable acre whether water is used thereon or not; for all water delivered between June 16 and August 15 a charge will be made of 75 cents per acre-foot and for all water delivered during the balance of the irrigation season a charge will be made of 50 cents per acre-foot. The minimum charge of $1 will be applied in payment of the charges under the acre-foot rates.

CHRONOLOGICAL SUMMARY.

Reconnoissance made and preliminary surveys begun in 1903.

Construction recommended by board of engineers, February 1, 1904.

Construction authorized by Secretary, February 10, 1904.

Corbett diversion dam completed June, 1907.

Corbett tunnel completed November, 1907.

First irrigation by Reclamation Service, season of 1908.

Shoshone Dam completed January, 1910.

Project 54 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Shoshone project provides for the storage of flood waters of Shoshone River in a reservoir controlled by Shoshone Dam, about 8 miles above Cody, Wyo.; the diversion of water from Shoshone River by a dam at Corbett, about

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[1] Railroad sidings only.

[2] Population less than 25.

16 miles below the reservoir, and through the Corbett Tunnel into a canal system supplying water to lands on the north side of the river in the vicinity of Ralston, Powell, Garland, Mantua, Frannie, and Deaver; the diversion into the Willwood Canal for the irrigation of lands on the south side of the Shoshone River; and the diversion into the north side high line from the Shoshone Dam for the irrigation of lands lying on the north side of the Shoshone River above the Garland Canal system, and extending from the lower end of the Shoshone Canyon near Cody to the divide between the Shoshone River and Clarks Fork drainage.

The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The Shoshone Dam, Corbett Dam, Corbett Tunnel, Garland Canal, about 34 miles of Frannie Canal, the lateral and distributary system for approximately 61,000 acres in the vicinity of Ralston, Powell, Garland, Mantua, Deaver, and Frannie have been completed, and considerable work has been accomplished on the construction of the lateral system for about 3,000 acres more near the railroad station at Frannie but which probably can not be completed in time to open for settlement in the fall of 1918.

Future operations include the construction of the Willwood and high line canals and the completion of additional units in the Frannie division, but on account of a shortage of men and teams, progress has been interfered with and numerous extensions have been granted from time to time to the several contractors.

SUMMARY OF GENERAL DATA FOR SHOSHONE PROJECT TO END OF FISCAL YEAR 1918.

Areas:			
Irrigable acreage when project is complete			147,228
Public land entered to end of fiscal year		47,896	
Public land open to entry at end of fiscal year		3,619	
Public land withdrawn at end of fiscal year		86,400	
State land		6,326	
Private land		2,987	
Acreage service could have supplied, season of 1917			43,265
Estimated addition in fiscal year 1919			24,000
Estimated acreage service can supply, July 1, 1919			67,265
Acreage actually irrigated, season of 1917			32,764
Acreage cropped under irrigation, season of 1917			31,554
Crops:			
Value of irrigated crops, season of 1917			$1,061,180.00
Value of irrigated crops, per acre cropped			$33.63
Finances:			
Net construction cost to end of fiscal year			$5,450,384.61
Per cent completed at end of fiscal year			54
Appropriated for fiscal year 1919, total			$400,000.00
Allotment of construction, fiscal year 1919			$239,500.00
Estimated per cent completed, June 30, 1919			56
Proposed appropriation for construction, fiscal year 1920			$648,000.00
Estimated gross construction cost			$6,416,047.73
Estimated per cent completed, June 30, 1920			64
Announced construction charges per acre, $57, $58, $59, $66.			
Appropriation, fiscal year 1918			[1] $784,822.29
Expenditures during fiscal year, chargeable to 1918 appropriation:			
Disbursements	$392,697.75		
Transfers	30,110.62		
		$422,808.37	
Registered liabilities chargeable to 1918 appropriation		45,351.37	
Contract obligations wholly covered by 1918 appropriation		8,087.28	
Estimated engineering expenses on contract work wholly covered by 1918 appropriation		808.73	
			$477,055.75
Unencumbered balance, July 1, 1918			307,766.54

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[1] Includes balance of 1916 and 1917 appropriations and refunds authorized to be added to 1918 appropriation by sundry civil act, approved June 12, 1917.

Repayments:	
Value of construction water-right contracts	$2,857,080.62
Construction charges—	
Accrued to end of fiscal year	[1] 351,645.73
Collected to end of fiscal year	[2] 348,533.56
Uncollected at end of fiscal year	[3] 3,112.17
Operation and maintenance charges (public notice)—	
Accrued to end of fiscal year	186,166.63
Collected to end of fiscal year	179,167.70
Uncollected at end of fiscal year	6,998.93
Water-rental charges—	
Accrued to end of fiscal year	4,072.98
Collected to end of fiscal year	3,829.81
Uncollected at end of fiscal year	243.17

Drainage:		
Estimated acreage damaged by seepage to end of fiscal year		1,500
Miles of drains built to end of fiscal year—		
Open	13.7	
Closed	75.6	
		89.3
Estimated acreage protected by drains built to end of fiscal year		22,000
Estimated acreage to be protected by authorized system		39,000
Costs of drainage works to end of fiscal year		$601,356.20

CONSTRUCTION DURING FISCAL YEAR.

Canal system, Frannie division.—Work has been continued on the following contracts: No. 736, Peter Shirts, Garland, Wyo., structures, first unit; No. 737, Hoyt Hayden, Great Falls, Mont., Frannie Canal extension; No. 764, David Lewis, Cowley, Wyo., lateral system, second unit; No. 754, Tebbs & Taggart, Cowley, Wyo., lateral system, second unit; No. 755, N. O. Mortensen, Cowley, Wyo., lateral system, second unit; No. 774, Lynn Bros. & Peterson, Lovell, Wyo., portion of Frannie Canal.

On account of high cost of labor and supplies the contract with Peter Shirts was suspended September 15, 1917, and the work completed by Government forces, with the exception of about $1,600 worth of work which was constructed under a contract with Stanley & Fly, of Deaver, Wyo., dated September 11, 1917, and completed December 31, 1917. Lynn Bros. & Peterson completed the work covered by their contract on October 13, 1917. Hoyt Hayden has practically finished Frannie Canal, and the contractors on the lateral system have finished from 10 to 50 per cent of the work. A few additional contracts were executed during the fiscal year for hauling construction materials and excavation and back filling around structures.

With the exception of the Peter Shirts contract above mentioned all structures have been constructed by Government forces. The canal structures on the first unit, including the work on the suspended contract, were completed in time to deliver water to all entered farms. Good progress was maintained on second-unit structures, and at the close of the fiscal year this portion of the work was about 60 per cent completed.

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[1] Includes $254.54 supplemental construction charges to be collected as operation and maintenance.
[2] Includes $233.42 supplemental construction charges collected as operation and maintenance.
[3] Includes $18.12 supplemental construction operation and maintenance charges uncollected.

Frannie Tunnel.—At the end of the fiscal year 1917 the rock excavation on Frannie Tunnel was completed and the concrete lining 52 per cent completed. The construction crew was employed on more important work during the early part of the fiscal year 1918, and work on the tunnel lining was not resumed until December 10, 1917, and completed in March, 1918.

Concrete pressure pipe.—In the central portion of the Frannie division there are about 1,800 acres of good farming land which has an average height of 100 feet above the surrounding country. In order to bring water to this land it was necessary to take water from Frannie Canal just before it drops into the tunnel and convey it through a pressure pipe about 1 mile long, under a maximum head of 110 feet. After a careful consideration of the problem and the costs of different kinds of pipe it was decided to construct a reinforced concrete pipe, 27 inches inside diameter, 3-inch shell, and in lengths of 6 feet. The pipe was laid in a trench so as to give an earthen covering about 3 feet deep, the sections being joined by reinforced concrete collars. Work on the construction of the pipe was started in July and the last pipe poured October 10, 1917. About 65 per cent of the pipe was laid in the fall and the work completed in the spring of 1918.

From the end of the pressure pipe the water is carried through lateral 114F for a distance of about 2 miles to a small reservoir, which will be used not only for irrigation purposes but also for a domestic supply for the town of Deaver and adjacent farms.

Canal system, Garland division.—On the Garland division construction work has been continued on lateral 67F, which will furnish water to about 1,100 acres of land located north of Garland. The canal structures were constructed under contract No. 768 with Threet Bros., of Lovell, Wyo. The earthwork is covered by contract No. 758 with H. S. Jolley of Lovell. At the end of the fiscal year this work was about 65 per cent completed.

Corbett Tunnel.—During the past two years tests were made on the carrying capacity of Corbett Tunnel and it was found, on account of friction losses, that the capacity was about 15 per cent short of its designed capacity of 1,000 second-feet. In order to increase the quantity of water it was decided to place a smooth mortar coat on the floor which would result in a reduction of friction losses in about one-third of the wetted perimeter. Work was started in December, 1917, and completed in the early part of April, 1918, at a cost of $16,700.

Shoshone Dam.—Two Swiss chalets have been constructed at Shoshone Dam, to replace the old blacksmith shop and the engine house. These buildings harmonize with the rugged, mountainous scenery, and have made a decided improvement in the general appearance of the locality.

SEEPAGE AND DRAINAGE.

The construction of drainage works was continued during the fiscal year with one drag-line excavator and one Austin trencher. A total of 1.18 miles of open drain and 7.71 miles of closed tile drain were constructed. At the end of the fiscal year 13.74 miles of open and 75.62 miles of closed tile drains had been constructed on the Garland division. These works have relieved and protected the seeped and threatened areas in the central and southerly portions of the division with the exception of a tract about 2 miles southeast of Powell known as the dry lake bed, which at the present time is not open to entry. Drainage works will be required to unwater the farming lands which have become seeped in this vicinity and also reclaim this dry lake bed which can then be placed on the market for settlement. There will also be requirement for some additional tile drains north and south of the railroad from 3 to 4 miles west of Powell. This area is still productive, but during the summer months the water plane gets dangerously close to the surface and it will be necessary to protect it, as it is highly productive land.

Observations on the ground water plane and surface conditions in the northerly portion of the division indicate that extensive drainage works will be required to maintain these lands in a productive condition. The soil in this section which lies north of Bitter Creek has very little underlying gravel and its drainage presents some new problems which have not arisen in connection with works thus far constructed on this project. Investigations have been made over an area of about 15,000 acres and preliminary plans and estimates prepared, which indicate that upward of 60 miles of drains may be required to protect this area. In the spring of 1915 the water users on the Garland division accepted an increased charge of $7 per acre for the purpose of carrying on drainage work. This charge provided sufficient funds for continuing drainage work until the spring of 1918. In order to comply with the requirements of the reclamation extension act the question of a second increase in the construction charges was taken up with the water users and as a result favorable agreements were entered into with a large majority of the water users, providing for an increased charge of $12.50 per acre for continuing this work. The drag-line excavator started work on the deepening of Bitter Creek for the purpose of securing suitable outlets for this new system of drains and the Austin trencher started on the first closed tile drain in the heavy soil to the north of Bitter Creek. Arrangements have been made for the transfer of an additional drag-line excavator from the Huntley project in order to secure better progress on this work.

ECONOMIES OF GOVERNMENT WORK.

The average cost of the construction of all closed tile drains on the Garland division up to December 31, 1917, was $1.20 per linear foot as compared with $1.21 one year earlier. The average cost of drains constructed during the season 1917 was 98 cents per linear foot, which is slightly under the average cost of the entire drainage system, but is somewhat higher than the cost of work during the seasons of 1915 and 1916. Labor has advanced about 50 per cent and there has been a decided increase in the cost of supplies. The tile now being used was purchased before the increase in the price of this class of material. Conditions are such that it is impossible to make a favorable showing as compared with the cost of construction during the past two years. This statement also applies to construction work carried on by Government forces on the Frannie division. There one of the chief conditions which has influenced the cost of the work is the frequent turnover of the labor organization which at times has averaged 100 per cent per month. Contractors are seriously affected by the same conditions and find it impossible to complete work without a loss as the unit prices submitted were based upon conditions which existed before the declaration of war.

BOARD MEETINGS.

Date.	Topic.	Personnel.
1917.		
Aug. 13	Main canal, Willwood division	D. C. Henny, A. J. Wiley, Geo. O. Sanford.
Oct. 15	Drainage, Garland division	D. W. Murphy, Geo. O. Sanford, J. R. Iakisch.

OPERATION AND MAINTENANCE.

The canal system on the Garland division was operated as in previous years, water being delivered upon the request of the farmers until the maximum capacity of the canals had been reached. When additional requests were received it was necessary either to wait until someone had finished irrigating or else prorate the water to all of the farmers under the ditch. Under this method the service was satisfactory with very few exceptions, and in such instances every effort was made to give the best service possible at the earliest date.

Several of the old canal riders are with the Army and most of the operating force are new men who are not as experienced as has been the case in former years. This has resulted in less efficient service, but as a rule these shortcomings have been accepted by the water users in a very kindly spirit.

The first unit of the Frannie division has been operated since the beginning of the season. Although there have been several breaks in the new canals, at no time has there been any serious interruption in the deliveries of water, and on most of the entered lands the crops are in excellent condition. Some of the crops show the result of inexperienced men on land which is difficult to irrigate and there are nearly 5,000 acres of land planted to crops, nearly all of which is wheat and oats. This is about 50 per cent of the area that has thus far been covered by water-right application.

As in previous years there was considerable surface waste during periods of heavy run, but the present indications are that better use is being made of water on the farms and arrangements are now being made for recovering surface waste and applying it to beneficial use along the lower portion of some of the canals and distributaries.

In 1917 one short ditch was constructed from the south branch of Bitter Creek to lateral C. A protest was made by some of the private appropriators on Bitter Creek which resulted in the State water commissioner regulating the diversion works constructed by the United States. As there was a sufficient quantity of water in this branch of Bitter Creek to satisfy the requirements of all parties, no change was made during the season of 1917 in the head gates as regulated by the State authorities. As a result of conferences held by the State engineer during the past winter the Reclamation Service controlled these works during the season of 1918.

In connection with the deepening of Bitter Creek, plans were made to construct a canal which would recover the water flowing in Bitter Creek and convey it to the lower portion of the Garland main canal where it would be available for the irrigation of about 2,300 acres of land. Work on the construction of this canal was started early in the season of 1918 and was well advanced at the end of the fiscal year. The deepening of Bitter Creek and the construction of this canal interfered with certain rights claimed by private appropriators on Bitter Creek. Legal action has been initiated to determine the extent of the rights of the parties interested.

Historical review, Shoshone project.

Item.	1913	1914	1915	1916	1917	1918
Acreage for which service is prepared to supply water	41,309	41,168	42,816	42,623	43,265	55,407
Acreage irrigated	19,423	22,226	25,753	29,977	32,764	36,795
Number of farms irrigated	396	420	498	593	620	770
Miles of canal operated	242	245	247	266	286	381
Water diverted (acre-feet)	69,767	92,340	96,217	125,622	128,629	[1] 70,704
Water delivered to land (acre-feet)	40,436	52,789	54,668	70,247	68,730	[1] 35 344
Per acre of land irrigated (acre-feet)	2.08	2.38	2.12	2.34	2.10	[1] 0.90

[1] To June 30.

SETTLEMENT.

During the season of 1917 the estimated value of crops on the Garland division was over $1,000,000, with an average value per acre of $33.63, which is the highest in the history of the project. The development, both on the farms and in Powell, surpassed previous years and the financial condition of the settlers has shown a corresponding increase. The bank deposits, which are the best evidence of prosperity, were on June 30 about 30 per cent greater than during the year 1917. This statement applies only to the Garland division. On the Frannie division, the Bank of Deaver, with a capital of $10,000, has been in operation since about the first of the year, and on June 30 showed deposits of $29,775.

The area under water-right application on the Garland division was increased by 525 acres. No additional water-rights were taken out on State school land. What farm units remain subject to entry are not especially attractive and probably will not be filed upon for some time to come.

On July 24, 1917, a public sale of lots in Powell townsite resulted in the sale of 60 lots at a valuation of $11,657.50. In several instances bids ranged from $5 to $177 more than the appraisal. In addition to the public sale 104 additional lots were sold at an appraised value of $13,700, making in all a total of 164 lots, with a valuation of $25,357.50, sold during the fiscal year.

In Powell, building operations were prosecuted vigorously throughout the year and were stopped only at the approach of cold weather. It is conservatively estimated that at least $100,000 was expended in the construction of residences and business structures with probably another $100,000 invested in equipment. Among the most notable improvements are those of an extension to the Powell National Bank, providing office accommodations; the erection of the Lyric Theater, and the First National Bank building which cost about $30,000.

The sixth unit of the project, which is the first unit of the Frannie division, was opened to entry September 15 to 20. During this period 327 applications were received for 76 farm units. At the close of the year 144 filings had been allowed aggregating a total area of

9,262 acres. One application had also been received for 39.79 acres of State school land. There are 3 entries aggregating 148.16 acres which have been made, but which have not yet been passed upon by the land office, and these entries are not included in the above statement.

There still remains a total of 37 farms, aggregating 2,415 acres, subject to entry.

Deaver town site.—On August 29, 1917, lots in Deaver town site were opened to sale at public auction. There were 91 lots purchased at a price of $29,380, which is $2,305 more than the appraised value. The bids ranged from $5 to $500 above the appraisal. In two instances two lots which were appraised at $500 each brought $1,000 each at the sale. Since the date of the sale 39 additional lots have been disposed of at a total value of $8,900, making in all 130 lots with a valuation of $38,280.

Deaver town site is located on the main line of the Burlington Railroad from Billings to Denver, and the town's future is very bright. Considerable building activity is underway and most of the buildings being erected are substantial and of a permanent character.

It probably is not out of place under this caption to note the fact that the farmers on Shoshone project have entered heartily into increased food production. The acreage in wheat on the Garland division alone has increased about 250 per cent over that of 1917. On the Frannie division practically all the land has been seeded to grain.

Settlement data, Shoshone project.

Item.	1913	1914	1915	1916	1917	1918
Total number of farms on project	615	616	609	650	646	830
Population	1,279	1,400	1,500	1,800	2,000	[1] 3,000
Number of irrigated farms	396	424	460	577	620	770
Operated by owners or managers	349	359	363	458	465	610
Operated by tenants	47	65	97	119	155	160
Population	1,279	1,400	1,500	1,800	2,000	[1] 3,000
Number of towns	3	3	3	4	4	4
Population	515	525	515	650	700	[1] 1,000
Total population on farms and in towns	1,794	1,925	2,015	2,450	2,700	[1] 4,000
Number of public schools	6	6	6	6	6	7
Number of churches	6	6	7	7	7	8
Number of banks	3	3	3	3	3	5
Total capital stock	$60,000	$60,000	$60,000	$60,000	$60,000	$75,000
Amount of deposits	$146,000	$156,665	$177,228	$252,746	$361,000	$497,775
Number of depositors	850	1,037	1,290	1,500	1,875	2,000
Number of relinquishments	16	14	13	22	13	15

[1] Estimated.

PRINCIPAL CROPS.

During 1917 a total of 32,764 acres on the Garland division were irrigated and a total of 31,554 acres actually cropped. Alfalfa continues to be the leading crop, with 13,483 acres during 1917. The average value per acre of alfalfa was $33.60. The acreage in sugar beets amounted to 773 acres, with an average value of $63.98. The area in oats, wheat, and barley totaled 13,515 acres. The total value of these three crops amounted to $364,899. There were 568 acres in potatoes, with an average value per acre of $146.45.

On the Frannie division a considerable portion of the canal system on the first unit was completed so that it was possible to deliver water in the spring of 1917 to a large tract of land that could be easily prepared for crops. Arrangements were made with experienced farmers to do the work on a rental basis, the Reclamation Service furnishing land, seed, and water and receiving one-third of the crop produced and paying their portion of the threshing bill.

The following table shows the results accomplished:

Crop.	Acreage.	Yield.	
		Bushels.	Bushels per acre.
Hard wheat	468	5,528	11.8
Soft wheat	839	11,427	13.6
Oats	849	11,855	13.9
Beans	90	210	2.3

There were some excellent crops produced, and there were also some failures, which account for the low averages. As a rule the results were satisfactory to the rentor and the Service, and the portion of the crop surrendered covered nearly all expense incurred by the United States. The production of these crops had a very decided influence on the prospective settler, as it showed conclusively what the lands on the Frannie Division were capable of producing, and the preparation of the land added materially to its value and created a strong demand for these farms.

Crop report, Shoshone project, Garland Division, Wyoming, year of 1917.

Crop.	Area (acres.)	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	13,483	Ton	30,258	2.24	$15.00	$453,870	$33.60
Alfalfa seed	49	Bushel	173	3.53	11.00	1,903	38.83
Apples	4.75	Pound	1,280	269.47	.05	64	13.47
Barley	303	Bushel	4,491	14.83	1.15	5,165	17.05
Beans	131	...do	769	5.85	6.00	4,614	35.10
Beets, sugar	773	Ton	7,075	9.14	7.00	49,525	63.98
Clover hay	173	...do	256	1.48	15.00	3,840	22.20
Clover seed	354	Bushel	1,528	4.31	11.00	16,808	47.41
Corn, Indian	11.5	...do	196	17.04	1.50	294	25.56
Corn, fodder	66	Ton	362	5.46	15.00	5,430	81.90
Fruits, small	1.75	Pound	1,650	942.86	.10	165	94.29
Garden	251					25,920	103.37
Hay	137	Ton	114	.83	15.00	1,710	12.45
Oats	7,371	Bushel	185,198	25.13	.80	148,159	20.10
Onions	7	...do	1,410	194.48	1.50	2,115	291.72
Pasture	2,035					46,825	23.01
Potatoes	568	Bushel	118,788	209.22	.70	83,152	146.45
Rye	7	...do	40	5.71	1.15	46	6.57
Wheat	5,841	...do	114,365	19.58	1.85	211,575	36.22
Less duplicated areas	13						
Total cropped	31,554	Total and average				1,061,180	33.63

		Areas.	Acres.	Farms.	Per cent of project.
Irrigated, no crop:		Irrigable area farms reported	39,286	621	26.7
Nonbearing orchard	132	Irrigated area farms reported	32,764	621	22.2
Young alfalfa	2,467	Under water-right applications	32,386	619	22.0
Ground, fall plowed	281	Leased land	378	2	.2
Miscellaneous	159	Cropped area farms reported	31,554	621	21.4
Less duplicated areas	1,829				
Total irrigated	32,764				

PUBLIC NOTICES AND ORDERS.

PUBLIC NOTICE, AUGUST 31, 1917.

1. In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and acts amendatory thereof and supplementary thereto, and particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), public notice for the sixth unit of the Shoshone project, Wyoming, is hereby issued, as follows:

2. **Lands for which water will be furnished.**—Upon proper application being made therefor, water will be furnished under said project in the irrigation season of 1917 and thereafter for the irrigable lands of the sixth unit, shown on farm-unit plats of the following townships of the sixth principal meridian, to wit: T. 57 N., R. 96 W.; T. 57 N., R. 97 W.; T. 56 N., R. 98 W.; T. 57 N., R. 98 W., which plats were approved by the Secretary of the Interior on August 31, 1917, and are on file in the office of the project manager, United States Reclamation Service, Powell, Wyo., and the local land office at Lander, Wyo.

3. **When and how to make entry for public land.**—Homestead entries for the farm units shown on said plats embracing public lands of the United States may be made beginning September 20, 1917, at 9 o'clock a. m., at the said local land office. Every person desiring to acquire any of said public lands must execute a homestead application subject to the provisions of the reclamation law in manner required by law, which, with the required fees and commissions, accompanied by certificate of the project manager as to the filing of water-right application and payment of water-right charges as hereinafter provided, may be presented to said local land office in person, by mail, or otherwise, within a period of five days prior to the opening, to wit: On and from September 15, 1917, to and including 9 o'clock a. m., September 20, 1917. Applications presented after said period of five days will be filed and noted in the order of their receipt. Any applications not based on a prior settlement right will be subject to valid settlement claims asserted in the manner required by law.

4. **Simultaneous filings for public lands.**—Applications reaching said local land office during said period of five days will be held and treated as simultaneously filed, and the register and receiver will dispose of them as follows:

(*a*) Where there is no conflict the application will be allowed, irrespective of whether settlement is alleged.

(*b*) In case of conflicting applications and only one of the applicants alleges prior settlement, his application will be allowed and the others rejected.

(*c*) If two or more conflicting applications, each containing allegations of prior settlement, are received, a hearing, restricted to those alleging such right, will be ordered to determine the priority of right.

(*d*) Where there are conflicting applications in which no one of the several applicants claims prior settlement the register and receiver will write on cards the names of the several applicants, and each of these cards will be placed in an envelope upon which there is no distinctive or identifying mark, and at 2 o'clock p. m., on the date of opening to entry, if practicable (if not, at the same hour one day later), after all the envelopes containing the names of the several applicants shall have been thoroughly mixed in the presence of such persons as may desire to be present, they will be drawn and numbered in order. The cards as drawn and numbered will be securely fastened to the applications of the respective persons, and the applications will be allowed in such order. Applications conflicting in whole with those previously allowed will be rejected in the usual manner.

5. **Failure of applicant to obtain public land applied for.**—Where any applicant fails to obtain land applied for by him he will be permitted to elect whether he will amend his application to embrace other lands not affected by pending applications and otherwise subject thereto when such amended application is presented, or withdraw his original application without prejudice. In the event of such withdrawal the fees and commissions will be returned by the receiver, and the water-right charges deposited will be returned by the project manager upon surrender of the certificate of filing issued by the project manager.

6. **Warning against unlawful settlement upon public land.**—No person will be permitted to gain or exercise any right whatever under any settlement or occupation of any of said public lands, begun at or prior to 9 a. m., September 20, 1917; provided, however, that this shall not affect any valid existing right obtained by settlement or entry while the land was subject thereto.

7. **Limit of area for which water right may be secured.**—The limit of area per entry representing the acreage which, in the opinion of the Secretary of the Interior, may be reasonably required for the support of a family upon such lands, is fixed as shown upon the plats for the several farm units. The maximum limit of area for which water-right application may be made for lands in private ownership shall be 160 acres of irrigable land for each land owner.

8. **Application for water right.**—All water-right applications, whether for public or private lands, must be made to the project manager, United States Reclamation Service, Powell, Wyo., upon forms provided for that purpose, and may be made on and after the date hereof. In the case of public lands, each water-right application must be for a specified farm unit, and more than one person may make such application for the same farm unit. A certificate of filing will be issued each applicant by the project manager. Filing of water-right application and issuance of certificate give no preference right to entry on public lands. Only when the project manager is notified by the local land office that an entry has been allowed will acceptance of the water-right application be indorsed thereon. Whereupon all other water-right applications affecting the farm unit in question, with payments made, will be returned to the respective applicants upon surrender by them of the certificates of filing issued by the project manager.

9. **Classes of charges for water rights.**—The water-right charges are of two kinds, to wit: (1) A charge against each irrigable acre to cover cost of construction of the irrigation system, termed the construction charge; and (2) an annual charge against each irrigable acre to cover cost of operation and maintenance of the system, termed the operation and maintenance charge.

10. **Construction charge.**—The construction charge shall be $66 per acre of irrigable land, payable as follows:

An initial payment of 5 per cent of the construction charge shall be made at the time of filing water-right application, and the remainder of the construction charge shall be due and payable in 15 annual installments, the first 5 of which shall each be 5 per cent and the remainder each 7 per cent of the total construction charge. The first of said 15 annual installments shall become due and payable December 1 of the fifth calendar year after the initial installment, and subsequent installments shall become due and payable on December 1 of each calendar year thereafter.

11. **Provision for drainage.**—The construction charges hereinabove fixed include $5 per irrigable acre, which is intended to provide a fund for such drainage work as may become necessary, and when a sum equal to such amount has been expended, any additional works needed to maintain the productivity of the land for which expenditures are to be made by the United States must be provided by increasing the construction charges in accordance with the provisions of section 4 of said reclamation extension act.

12. **Increased construction charges in certain cases.**—In all cases where water-right application for lands in private ownership or for lands under entry not subject to the reclamation law, shall not be made within one year from the date of this notice, the construction charge for such lands shall be increased 5 per cent each year until such application is made and an initial installment paid.

13. **Advance payment of construction charges permissible.**—Any water-right applicant may, at his option, pay in advance the whole or any part of any construction charge owing by him within any shorter period than that prescribed by this notice.

14. **Operation and maintenance charge.**—The operation and maintenance charges for the sixth unit will be duly announced at a subsequent date. Where water-right application is made for public land entered under the reclamation law after June 15 in any year, and where water-right application is made after August 1 in any year for land in private ownership, no operation and maintenance charge shall be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

15. **Place and method of payment of water-right charges.**—All water-right charges must be paid at the office of the United States Reclamation Service, Powell, Wyo., in cash, or by New York draft, or money order, payable to the special fiscal agent, United States Reclamation Service.

16. **Reservation as to crops**—The Secretary of the Interior reserves the right to enter upon the public lands herein described until the end of the year 1917, and properly care for, harvest, and remove any crops which have been grown thereon in the present year, and in so doing will cause as little injury as practicable to the land and improvements thereon.

ALEXANDER T. VOGELSANG,
First Assistant Secretary of the Interior.

PUBLIC NOTICE, APRIL 1, 1918.

1. **Annual operation and maintenance charges.**—In pursuance of section 4 of the reclamation act of June 17, 1902 (32 Stat., 388), and of acts amendatory thereof or supplementary thereto, particularly the reclamation extension act of August 13, 1914 (38 Stat., 686), announcement is hereby made that the annual operation and maintenance charge for the irrigation season of 1918 and thereafter until

further notice against all lands of the Shoshone Project, Wyo., under public notice, shall be as follows: A minimum charge of $1 per irrigable acre will be made whether water is used thereon or not. For all water delivered from June 16 to August 15, inclusive, a charge will be made of 75 cents per acre-foot, and for all water delivered during the balance of the irrigation season a charge will be made of 50 cents per acre-foot. The minimum charge of $1 will be applied in payment of the charges under the acre-foot rates. All operation and maintenance charges will be due and payable on March 1 of each year for the preceding irrigation season; but where water-right application is made for public land entered under the reclamation law after June 15, or where water-right application is made after August 1 for land in private ownership, no operation and maintenance charge will be made for water delivered during the remainder of the irrigation season in which the water-right application is made.

E. C. BRADLEY,
Assistant to the Secretary of the Interior.

FINANCIAL STATEMENT.

Project balance sheet, Shoshone project, June 30, 1918.

Cash		$4,201.46
Inventory of stock on hand		110,592.84
Accounts receivable		2,519,417.16
Construction work contracted		50,541.83
Construction cost	$5,528,547.73	
Less construction revenue earnings	78,163.12	
		5,450,384.61
Operation and maintenance cost	253,711.13	
Less operation and maintenance revenue earnings	4,329.99	249,381.14
Total		8,384,519.04
Accounts payable		71,348.77
Contingent obligations		54,524.06
Reserves for repayment to reclamation fund of cost of project		3,059,971.37
Miscellaneous accruals		95,373.50
Capital investment:		
Disbursement, transfer, and joint construction voucher received	5,966,467.79	
Collection, transfer, refund, and joint construction vouchers issued	863,166.45	
Net investment		5,103,301.34
Total		8,384,519.04

Feature costs of Shoshone projects to June 30, 1918.

Principal feature.	Costs.	
	Fiscal year 1918.	Total to June 30, 1918
Examination and surveys: Project as a whole	[1] $846.16	$65,417.53
Storage system: Shoshone Dam	2,687.03	1,358,425.71
Canal system:		
Garland division—		
Corbett diversion dam		97,467.80
Controlling works, Ralston Reservoir		17,596.19
Garland Canal headworks		16,238.75
Settling basin and spillway		23,853.01
Corbett Tunnel	10,837.87	1,181,220.12
Sluicing tunnel		14,472.72
Garland Canal division 1		342,931.84
Garland Canal division 2 and 4		59,873.77
Garland Canal division 3		27,113.41
Crossings under Chicago, Burlington & Quincy R R		11,026.97
Frannie Canal, schedules 1, 2, 3, and 4		84,156.83
Garland Flat wells		2,130.84
31 reinforced drops, main canal		79,510.92
Temporary flume, Alkali Creek		8,830.72
Eaglesnest crossing and flume		53,770.60
Inclined drop, Alkali Creek		28,267.10

[1] Deduct.

Feature costs of Shoshone projects to June 30, 1918—Continued.

Principal feature.	Costs.	
	Fiscal year 1918.	Total to June 30, 1918.
Canal system—Continued.		
Frannie Division—		
Surveys, main Canal	$476.34	$19,948.77
Frannie Tunnel portals	1,342.74	8,884.58
Frannie Tunnel proper	14,786.65	44,887.45
Frannie main canal, Government forces		9,050.31
Frannie main canal contracts	56,931.95	135,980.91
Wastewater ditches	9.52	323.35
Earthwork	6,190.66	6,423.77
Structures	47,010.32	52,702.22
Willwood division—Surveys	938.63	15,648.33
Highline division—Surveys		34,358.15
Total canal system	138,524.68	2,376,669.43
Lateral system:		
Garland division—		
Surveys		6,852.64
Earthwork	53,326.70	272,848.98
Structures	13,281.58	89,494.28
Frannie division—		
Surveys	6,540.38	33,843.18
Earthwork	22,667.12	117,802.55
Structures	124,852.28	234,838.63
Willwood division—Surveys	5.97	875.53
Highline division—Surveys		6,903.49
Total lateral system	220,674.03	763,459.28
Drainage system:		
Surveys	2,254.08	24,953.93
Open drains	13,710.99	99,225.63
Closed drains	38,524.71	477,176.64
Total drainage system	54,489.78	601,356.20
Farm units:		
Garland division—Surveys	236.58	11,050.77
Frannie division—Surveys	3,659.32	8,336.86
Willwood division—Surveys	10.34	821.48
Total farm units	3,906.24	20,209.11
Permanent improvements:		
Garland division—		
Buildings	1,530.72	13,211.23
Roads and bridges	44.89	21,932.81
Frannie division—		
Buildings	2,200.94	10,185.05
Roads	664.77	881.22
Water supply	20,312.47	20,312.47
Shoshone Dam division—		
Buildings	2,018.79	2,291.21
Roads		133,704.77
Total permanent improvements	26,772.58	202,518.76
Telephone system:		
Garland division		4,701.39
Frannie division	4,859.24	5,083.85
Shoshone Dam		5,758.28
Total telephone system	4,859.24	15,543.52
Operation and maintenance during construction	15,551.00	17,908.07
Undistributed clearing accounts	3,237.49	4,493.75
Balance in plant accounts	12,549.94	53,129.30
Miscellaneous supplemental construction during operation and maintenance		49,269.32
Operation and maintenance charges transferred to and compounded with construction charges		147.75
Gross construction costs to June 30, 1918	482,405.85	5,528,547.73
Less revenues earned during construction period:		
Rental of buildings and tents	2,538.16	16,250.72
Rental of grazing and farming lands	581.00	3,815.90
Rentals of irrigation water	132.00	132.00
Rentals of telephones and tolls	34.05	226.27
Contractors freight refunds	77.18	19,432.77
Other revenues unclassified	1,676.90	49,222.91
Profit hospital operations	114.79	934.49
Losses on operation, unclassified	[1] 7,629.35	[1] 11,851.94
	[1] 2,475.27	78,163.12
Net cost of construction of project to June 30, 1918		5,450,384.61

[1] Deduct.

Statement of cost by calendar years, Shoshone project.

Year ending Dec. 31—	Construction.	Operation and maintenance under public notice.	Total cost.
1907[1]	$2,238,120.02		$2,238,120.02
1908	710,703.69	$8,808.76	719,512.45
1909	413,333.86	15,278.27	428,612.13
1910	223,696.61	14,580.19	238,276.80
1911	193,474.31	20,525.05	213,999.36
1912	185,915.31	22,435.24	208,350.55
1913	116,739.58	29,708.59	146,448.17
1914	176,764.14	21,377.95	198,142.09
1915	243,615.32	23,185.20	266,801.52
1916	306,263.54	28,531.71	334,795.25
1917	533,768.57	35,583.88	569,352.45
June 30, 1918	186,152.78	33,695.29	219,848.07
	5,528,547.73	253,711.13	5,782,258.86

[1] Covers period from May 1, 1904, to Dec. 31, 1907.

Statement of cost by fiscal years, Shoshone project.

Year ending June 30—	Constructon.	Operation and maintenance under public notice.	Total cost.
1907[1]	$1,601,311.42		$1,601,311.42
1908	1,054,541.82	$5,274.65	1,059,816.47
1909	412,384.84	8,913.31	421,298.15
1910	439,389.11	16,711.14	456,100.25
1911	205,630.87	17,982.75	223,613.62
1912	121,766.37	20,917.99	142,684.36
1913	154,406.51	24,908.23	179,314.74
1914	149,693.27	30,040.27	179,733.54
1915	234,717.56	18,588.25	253,305.81
1916	256,794.68	25,695.79	282,490.47
1917	415,505.43	33,255.51	448,760.94
1918	482,405.85	51,423.24	533,829.09
	5,528,547.73	253,711.13	5,782,258.86

[1] Covers period from May 1, 1904, to June 30, 1907.

Estimated cost contemplated work, Shoshone project, during fiscal year, 1919.

Features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examinations and surveys: Extensions in Oregon Basin and Clarks Fork of Yellowstone River		$5,000
Storage: Buildings, Shoshone Dam		4,000
Canal system:		
Frannie division—		
Main canal (priming)	$2,000	
Structures, culverts, checks, etc	28,000	
Measuring devices	1,000	
Surveys, third unit	2,000	
Willwood division—Surveys, location	3,000	36,000
Lateral system:		
Frannie division—		
Laterals and sublaterals (priming)	1,000	
Structures, turnouts, drops, etc	60,000	
Measuring devices	3,000	
Surveys, location	2,000	
Willwood division—Surveys	2,000	68,000

Estimated cost contemplated work, Shoshone project, during fiscal year, 1919—Contd.

Features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Drainage:		
Garland division—Surveys, investigations, and construction of drainage works, under supplemental construction	$85,000	
Frannie division—Surveys, investigations, and construction drainage works under original construction	15,000	
		$100,000
Farm units:		
Willwood division—Surveys and office work on farm units	1,000	
Frannie division—Surveys and office work on farm units, third unit	2,000	
		3,000
Permanent improvements:		
Garland division—Construction ditch rider's house	1,000	
Frannie division—Construction two ditch riders' houses	2,000	
		3,000
Telephones: Extension of telephone line of Frannie division		1,500
Operation and maintenance under public notice:		
Garland division—		
Operation	22,000	
Maintenance	28,000	
Frannie division—		
Operation	11,000	
Maintenance	14,000	
		75,000
Plant and equipment:		
Two excavating machines	17,000	
Three automobiles or trucks	2,000	
Miscellaneous tools	1,000	
		20,000
Total		315,500

Operating costs and revenues, Shoshone project to June 30, 1918.

EXPENSES.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Storage works:						
Shoshone Dam and Reservoir	$5,983.74	$735.65	$6,719.39	$20,672.13	$11,713.41	$32,385.54
Maintenance of buildings					158.91	158.91
Shoshone Reservoir highway					196.83	196.83
	5,983.74	735.65	6,719.39	20,672.13	12,069.15	32,741.28
Canal system:						
Garland Canal, divisions 1 and 2	831.71	1,906.63	2,738.34	23,433.62	17,163.33	40,596.95
Garland Canal, divisions 3 and 4	58.25	799.60	857.85	1,855.38	7,150.48	9,005.86
Frannie Canal, Garland division	[1]16.67	210.94	194.27	1,678.44	1,039.46	2,717.90
Frannie Canal, Frannie division		91.74	91.74		91.74	91.74
Corbett diversion dam	951.86	131.02	1,082.88	2,974.55	181.57	3,156.12
Relining Corbett Tunnel, Garland division		8,949.12	8,949.12		8,949.12	8,949.12
Ralston tower		[1]108.65	[1]108.65		316.35	316.35
Maintenance bridges, main canal					261.63	261.63
	1,825.15	11,980.40	13,805.55	29,941.99	35,153.68	65,095.67

[1] Deduct.

Operating costs and revenues, Shoshone project to June 30, 1918—Continued.

EXPENSES—Continued.

	Fiscal year 1918.			To end of fiscal year 1918.		
	Operation.	Maintenance.	Total.	Operation.	Maintenance.	Total.
Lateral system:						
Garland division—						
Distribution system	$9,798.52	$14,023.59	$23,822.11	$69,059.84	$64,462.90	$133,522.74
Buildings, Garland flat		244.72	244.72		354.78	354.78
Surface drains, Garland division		20.47	20.47	74.68	2,161.23	2,235.91
Taking waste water lateral system	303.81		303.81	303.81		303.81
Determining seeped areas					1,505.62	1,505.62
Bridges, culverts, and roads		[1] 5.97	[1] 5.97		862.14	862.14
Frannie division—Distribution system	2,326.72	1,692.23	4,018.95	2,326.72	1,692.23	4,018.95
	12,429.05	15,975.04	28,404.09	71,765.05	71,038.90	142,803.95
Drainage system:						
Open drains		930.57	930.57	861.40	2,990.22	3,851.62
Closed drains	38.89	1,333.08	1,371.97	1,169.38	5,113.10	6,282.48
	38.89	2,263.65	2,302.54	2,030.78	8,103.32	10,134.10
Undistributed expenses:						
Accrued and unpaid operation and maintenance to construction					[1] 147.75	[1] 147.75
Telephone operation and maintenance					532.12	532.12
Balance in plant accounts		984.91	984.91		1,847.71	1,847.71
Unadjusted clearing accounts		9.64	9.64			
Farming operations		[1] 802.88	[1] 802.88		704.05	704.05
		191.67	191.67		2,936.13	2,936.13
Total	20,276.83	31,146.41	51,423.24	124,409.95	129,301.18	253,711.13

[1] Deduct.

REVENUES.

Items.	Fiscal year 1918.	To end of fiscal year 1918.
Operation and maintenance charges accrued on contracts with water-right applicants	$28,802.13	$186,166.63
Operation and maintenance charges paid in advance by water-right applicants	[1] 812.82	283.33
Operation and maintenance charges paid and forfeited by water-right applicants		1,640.91
Penalties on operation and maintenance charges accrued on contracts with water-right applicants	439.23	1,896.73
Rental of lands and buildings during operating period	166.80	389.01
Rentals of irrigation water	609.20	3,940.98
Less discount allowed on operation and maintenance charges accrued on contracts with water-right applicants (contra)	[1] 909.43	[1] 2,266.30
Total	28,295.11	192,051.29
Difference (deficit)	23,128.13	61,659.84

[1] Deduct.

SECONDARY PROJECTS.

(A description of secondary projects may be found in the Fifteenth Annual Report, pp. 508–546, and in the Sixteenth Annual Report, pp. 348–363 Only those projects on which work has been done during the fiscal year 1918 are referred to here.)

ARIZONA.

COOPERATIVE WELL DRILLING, MOHAVE COUNTY.

See Sixteenth Annual Report, page 514.

After drilling 1,040 feet on an artesian well in Hualpai Valley, the contractors abandoned the work. Advertisements and proposals for continuing the work were issued February 15, 1918. No bids were received and further investigation has been suspended until labor and material can be secured.

CALIFORNIA.

IMPERIAL VALLEY PROJECT.

This project embraces 500,000 acres of land south of the Salton Sea now served by the Imperial irrigation district and 600,000 acres outside of the district. The irrigation plan contemplates diverting water from the Colorado River at the Laguna Dam and the construction of a canal of sufficient capacity to supply all of the irrigable land in the Salton Sea Basin.

On July 6, 1918, a contract was executed between the Secretary of the Interior and the Imperial Laguna Water Co. under the terms of which the company undertook to make detail surveys, specifications, and estimates of a canal system which it proposed to construct for the irrigation of private holdings and public lands withdrawn from entry in Imperial County, Cal. In the construction of this system the Laguna Dam and other works built by the Reclamation Service were to be utilized. The contract provided for the appointment of an engineer by the Secretary of the Interior to work and cooperate with the engineers of the company and to make a separate and independent report in case he was unable to concur in the conclusions arrived at by the company and its engineers. The Secretary reserved the right (*a*) to require further or additional surveys, (*b*) reject or disapprove of said surveys in their entirety, (*c*) accept and approve the surveys, specifications, and estimates in their entirety, in which event the company should have the right, under certain conditions named in the contract, to connect its proposed irrigation system with the Laguna Dam and to enlarge the main canal of the Yuma project. Provisions are made in the contract to cover the priority rights of the Government to the natural flow of the Colorado River and for the protection of the water users under the proposed system. The report of the engineers of the Imperial Laguna Water Co. covering the investigations made under this contract gives the gross area covered by the works contemplated as

751,000 acres, of which 606,600 acres can be irrigated by gravity and 31,000 acres by pumping. Of the total irrigable acreage, it is estimated that 450,000 acres can be relied upon to bear the cost of the main canal and distribution system and that on that basis the cost of the project will be about $26 per acre.

Mr. Porter J. Preston, the engineer appointed by the Secretary of the Interior, did not concur in this report, but concludes that there are insufficient data upon which to base an estimate of cost, either as a whole or unit cost per acre, but that the data obtained by the engineers of the Imperial Laguna Water Co. "demonstrate that there is a sufficient body of irrigable land to justify a more thorough and detailed investigation to obtain sufficient data upon which to base an estimate of cost of the project."

All-American canal.—On February 16, 1918, a cooperative agreement was entered into with the Imperial irrigation district to make a complete investigation, survey, and cost estimate of an all-American canal from the Laguna Dam into Imperial Valley, Cal., two-thirds of the cost of this investigation to be borne by the district and one-third by the Government.

The investigations contemplated are to follow a general plan agreed upon by the following engineers: Mr. C. E. Grunsky, representing the Imperial irrigation district; Mr. Elwood Mead, acting for the University of California; and Mr. W. W. Schlecht for the Reclamation Service. Surveys are under way to determine the feasibility of supplying an adequate water supply for the irrigation of the irrigable lands in the Imperial Valley. The field work is in charge of Mr. Porter J. Preston.

CALIFORNIA RECONNOISSANCE.

The project manager of the Orland project has undertaken the reconnoissance of several areas in California to ascertain their irrigation possibilities.

COLORADO.

COLORADO RIVER BASIN.

See Sixteenth Annual Report, pages 348–358.

A study of all the available data relative to water supply, storage, and irrigable areas in the Colorado River Basin was made by Consulting Engineer Wiley for the purpose of outlining a comprehensive plan for flood control conservation of water supply, and the development of irrigation possibilities.

Ouray Reservoir Site.—Test borings have been made at the Ouray Dam site on the Green River in Utah. The river bed at this point is about 1,300 feet in width, one-half of which is occupied by the river channel, the other half being from 3½ to 7 feet above ordinary low water, but is submerged during high water periods.

The material encountered is generally an extremely fine silt, changing to sand near the river channel. The average depth of holes is 91.5 feet, minimum depth 25 feet, maximum 122 feet. A fine-grained sandstone which is seamy and broken has been struck in nearly all of the holes.

IDAHO.

Consulting Engineer A. J. Wiley has recently made a study of the irrigation possibilities in Idaho, from which he concludes that the following projects are the most meritorious:

BOISE PROJECT EXTENSION.

This project includes a total area of 53,000 acres, 39,000 acres of which cover the most desirable portions of the Black Canyon irrigation district. Fairly complete investigations have already been made and no further preliminary work is required.

BIG BRUNEAU PROJECT.

This project includes an area of about 400,000 acres of irrigable land. Water will be supplied from a storage reservoir on Snake River at American Falls and taken to the irrigable area in a canal 80 miles long. The land is decidedly rough in contour and variable in quality. To determine the feasibility of this project, a large amount of preliminary work will be required.

MOUNTAIN HOME PROJECT.

This project includes a gross area of about 700,000 acres, lying between Glenns Ferry and Mora, which can only be reached by the construction of a canal 110 miles long, 15 miles of which would be very difficult to construct. Preliminary levels have been run along the line of this canal, but no estimates of cost have been made. It is proposed to secure the water supply for this project from the American Falls Reservoir, the storage capacity of which is not sufficient to furnish both the Mountain Home and Big Bruneau projects.

NORTH SIDE MINIDOKA PUMPING PROJECT.

This project includes an area of 102,500 acres, which it is proposed to irrigate by pumping from above the Minidoka Dam to a maximum height of 120 feet. The power would be developed at the Eagle Rock site on Snake River, and a storage reservoir of 500,000 acre-feet capacity could be provided at Island Park Reservoir site on the North Fork of the Snake River. Only rough trial lines have been run to determine the irrigable area. Detail topography on a scale of 100 feet to the inch, with contour intervals of 2 feet, has been taken at the dam site of the Island Park Reservoir.

MONTANA.

BITTERROOT VALLEY PROJECT.

In response to a petition from the water users' association of Stevensville, Mont., this project has been examined by engineers of the Reclamation Service.

About 30,000 acres of land, located in Missoula and Ravalli Counties, are irrigable from the irrigation system constructed by the Bitterroot Valley Irrigation Co., now in the hands of a receiver. Approximately 15,000 acres are in cultivation.

The works already constructed consist of a dam at Lake Como and a canal from Rock Creek, crossing the Bitterroot River and extending in a northerly direction about 70 miles to near the town of Florence. The dam at Lake Como and earth sections of the canal are well constructed, but there are some 9 miles of wooden flumes along the canal line that require extensive repairs or rebuilding. Any further development of this project will be in the way of betterments.

NEVADA.

UPPER CARSON PROJECT.

This project is being investigated in cooperation with "Irrigation district No. 1, Carson Valley unit, Truckee-Carson project," and includes between 30,000 and 40,000 acres of land in Douglas County. Of this area about 5,000 acres now have a sufficient water supply and 14,000 acres partial water rights, the remaining acreage being without any present water supply. Water will be taken from the east and west forks of the Carson River and storage provided if suitable reservoir can be provided. Several reservoir sites have been located and partially examined. Investigations are still in progress.

OREGON.

See Sixteenth Annual Report, page 361.

TEEL IRRIGATION DISTRICT.

The Teel irrigation district was organized in 1913 and comprises about 18,000 acres of land in Umatilla County. After making quite extensive surveys the people interested in the district petitioned to have the project examined and reported upon by the Government. Messrs. D. C. Henny, A. J. Wiley, and H. D. Newell, acting for the Government, after examining the irrigable area and accumulated data, reported that the lands are of excellent quality, and that the climate and transportation facilities are favorable. They concluded that the project has a water supply for 15,000 acres, requiring 58,000 acre-feet reservoir capacity, and that its cost, independent of charges for interest during construction and cost of financing, is likely to be close to $135 per acre.

OCHOCO PROJECT.

The Ochoco irrigation district has undertaken the construction of this project and paid to the Government $4,307.09 to cover one-half the cost of its investigation under the terms of a contract for cooperative work in Oregon between the United States and the State of Oregon dated May 5, 1913.

Consulting engineer A. J. Wiley has made a study and report on a number of the projects covered by the Oregon cooperative investigations and described in the Fifteenth Annual Report, pages 527 to 541. No other work has been done on these projects by the Reclamation Service.

SOUTH DAKOTA.

ANGOSTURA PROJECT.

The Angostura project is located in Custer and Fall River Counties, in southwestern South Dakota, and embraces a gross area of approximately 160,000 acres, the irrigable area being estimated at between 60,000 and 80,000 acres, depending upon how far the canal is extended on the south side of the river.

This project has been briefly referred to in the second, third, and fourth annual reports of the Reclamation Service, and a preliminary survey was made of it in the fall of 1913 by Mr. Littell Snidely under the supervision of the State engineer. On May 31, 1917, a contract was executed between the Secretary of the Interior and the governor of South Dakota, providing that surveys should be made in the Cheyenne Basin sufficient to ascertain the feasibility of irrigation projects therein. Under the provisions of this contract a preliminary survey of the Angostura project was made during the summer and fall of 1917. The irrigation plan contemplates the construction of a combination storage and diversion dam across the Cheyenne River at a point locally known as "Jackson Narrows." The proposed dam will have a height of 163 feet above the stream bed. The area flooded by the reservoir created by the construction of this dam would be about 6,600 acres and would provide a total storage capacity of 350,000 acre-feet, of which 250,000 acre feet will be available for irrigation. The outlet from this reservoir would be by means of a tunnel 1,000 feet long, located 100 feet above the bed of the river. From this tunnel the canal extends along the north side of the river for a distance of about 8½ miles, where it divides into two branches, the north fork following the slope of the country for 70 miles. The south branch crosses the river by means of a siphon 2,400 feet in length and follows the grade contour 49 miles to Hay Canyon, with a possible extension of between 30 and 40 miles to the west boundary of the Pine Ridge Indian Reservation.

Test borings were made at the Angostura dam site, a soft sand rock being struck at shallow depths. Detail topography of the dam site has been taken on a scale of 100 feet to the inch with contour intervals of 5 feet. Canal line topography was taken on the north side of the river from the dam site to and across Beaver Creek, near the town of Buffalo Gap. Transit location was run from Beaver Creek to the "Bad Lands" north of the river, a distance of 49 miles. On the south side of the river a stadia survey was made for a distance of 27 miles. From the end of this line a canal location has been projected on the topographic sheets of the United States Geological Survey to the Pine Ridge Indian Reservation. Tentative plans for the Angostura dam have been prepared; one for a multiple arch structure, and the other for a rock-fill dam. All of the available data relating to water supply have been compiled and estimates of the cost of construction, including distribution and drainage systems, have been made. These estimates show that under present conditions the cost of the project would be from $150 to $160 per acre.

UTAH.

CASTLE PEAK PROJECT.

This project is located at an elevation of from 5,200 feet to 5,300 feet above sea level in Wasatch, Duchesne, and Uinta Counties. The nearest railroad station is Price on the Denver & Rio Grande Railroad, 78 miles west of the project. The irrigable area is estimated at between 50,000 and 60,000 acres with a general slope of about 50 feet to the mile. The soil is sandy loam with gravelly subsoil.

Water is to be obtained from the natural flow of the Strawberry and Duchesne rivers supplemented during low-water periods by storage in the proposed Stillwater reservoir. To reach the irrigable area a canal about 40 miles in length will be required.

All Government land within the project has been withdrawn under the second form of withdrawal. In cooperation with the State of Utah studies are being made of the discharge of and appropriations from the Duchesne and Strawberry Rivers and their tributaries. Application to appropriate 50,000 acre-feet of water for the use of the project has been filed to comply with the laws of the State of Utah. Preliminary surveys of the Castle Peak project are now in progress.

DIXIE PROJECT.

This project is located in Washington County and includes between 30,000 and 40,000 acres of land made up of a number of benches dividing the irrigable area into tracts of from 4,000 to 6,000 acres. Near the town of Hurricane about 1,600 acres are now in cultivation. The crops produced are wheat, corn, alfalfa, cotton, almonds, walnuts, figs, small fruits, and vegetables.

To develop this project, a storage and diversion dam will have to be constructed in the Virgin River Canyon some 2 miles below Virgin City. A tunnel about 4 miles long will be required to divert the water and 20 miles of canal to convey it from the tunnel to the irrigable lands.

All of the public lands within this project have been withdrawn from entry. A preliminary reconnoissance of the Dixie project was made by Mr. J. L. Lytle, project manager of the Strawberry Valley project, in March, 1918. Steps have been taken to ascertain the silt content of the Virgin River.

PRICE RIVER PROJECT.

In June, 1917, the dam of the Mammoth Reservoir, used in connection with the irrigation works constructed by the Price River Irrigation Co. for the irrigation of some 25,000 acres of land in the vicinity of Price, Utah, failed and the Reclamation Service was asked to examine the project to ascertain what steps could be taken to assure the settlers a sufficient water supply. It was found that about 8,000 acres are now in cultivation and that a large additional acreage of very productive land could be reclaimed provided a suitable reservoir were built and that there was enough unappropriated water available for storage.

It was estimated that the Pleasant Valley Reservoir site, located on Fish Creek near the town of Schofield, would impound 175,000 acre-feet of water with a dam 90 feet high. The drainage area above this reservoir site is 167 square miles and it is estimated that the run-off from this area would be 87,500 acre-feet. No records of the discharge of Fish Creek at the proposed dam site are available, but in cooperation with the State of Utah, the United States Geological Survey has established a gauging station at this point to procure data from which a study can be made of the water supply obtainable. The examination of the Price River project was made by Mr. J. L. Lytle, project manager of the Strawberry Valley project, Utah.

WYOMING.

WYOMING COOPERATIVE WORK.

On January 15, 1918, a contract was entered into between the Secretary of the Interior and the governor of Wyoming for a cooperative investigation of the valley of the North Platte River to determine the possibility and feasibility of the further reclamation of arid lands therein. The examination will cover a study of available data in the offices of the Reclamation Service and State engineer of Wyoming, and a reconnoissance of the lands irrigated from the North Platte and South Platte Rivers in Colorado, Wyoming, and Nebraska. A study will also be made of the water supply for Nebraska canals and the North Platte project. Present irrigation practice in diversion and use of water and the possibility of placing additional acreage under irrigation will be examined. This investigation is now being made under the immediate direction of Mr. Harold Conkling, engineer, United States Reclamation Service, and R. I. Meeker, special assistant State engineer, Wyoming.

LYMAN PROJECT.

This project is located in Uinta County and was examined in 1915 by Mr. C. P. Smith, who reported that 35,000 to 40,000 acres of land could probably be irrigated in addition to the area already covered by private ditches. A preliminary survey of the project has been undertaken. Mr. Garfield Stubblefield is in charge of the field work

RIVERTON (WIND RIVER) (INDIAN) PROJECT.

A change in the name of this project from Wind River to Riverton has been adopted to avoid confusion with the neighboring Wind River project of the Indian Service.

A partial investigation of this project is noted in the Sixteenth Annual Report of the Reclamation Service at page 362. The Indian appropriation act for the fiscal year ending June 30, 1918 (39 Stat., 969), provided $5,000 for additional investigations, which the Secretary of the Interior instructed the Reclamation Service to make. These were in charge of Mr. C. T. Pease, engineer, and what follows is very largely extracted from his report, dated November, 1917.

LOCATION AND GENERAL DESCRIPTION.

The project is within the "ceded lands" of the Shoshone Indian Reservation, Fremont County, Wyo. As originally outlined, it was bounded on the north and northwest by an irregular line passing through Tps. 4 N., Rs. 1 to 3 W., Wind River meridian to a point on the line between Tps. 4 and 5 N., R. 1 E.; thence east along the township line to the Bighorn River which forms its eastern and southeastern boundary. The Wind River limits its extent to the south and southwest. Within this area, there was supposed to be approximately 300,000 acres of irrigable land.

The topography of the country naturally divides the project into three units, which have been numbered in the order of their present and probable future development The first unit extends from Wind River to the divide forming the southern boundary of the Five Mile drainage basin. Practically all of the land in this unit that can be irrigated by gravity supply is already covered by numerous small ditches in the bottom lands and by the Wyoming No. 2 and LeClair-Riverton No. 2 canals on the lower benches. Above these canals there is a quantity of excellent land that can only be reached by pumping, the cost of which would be prohibitive.

The Wyoming No. 2 Canal was built by the Wyoming Central Irrigation Co., in 1906–7 and is capable of irrigating between 7,000 and 8,000 acres, of which about 6,000 acres are now under cultivation.

The LeClair Canal was constructed by the Indian Service and covers from 4,000 to 5,000 acres of which a trifle over 1,800 were cultivated in 1916.

The Riverton No. 2 is an extension of the LeClair built in 1914–15 by the owners of the lands which it serves. Between 14,000 and 15,000 acres of irrigable land can be supplied from this canal, about 5,000 acres being now in crop.

Unit No. 1 has the only railroad facilities within the project, being tributary to Riverton, a town of 1,500 population, located on a branch of the Chicago and Northwestern railway.

The second unit covers practically all of the irrigable area in the drainage basins of Five Mile and Muddy Creeks, east of the Wind River meridian to the Bighorn River and is the principal subject of this report.

The third unit embraces some 90,000 acres of land under the proposed Fremont Canal, which was located in 1906 by the State engineer of Wyoming. During this investigation only a hasty reconnaissance of this unit was undertaken, but this shows the greater part of the land to be much rougher and less desirable than that of the other units and that the cost per acre of supplying it with water would be considerably higher.

HISTORICAL.

In July, 1904, a reconnaissance of the ceded strip of the Shoshone Indian Reservation was made for the United States Reclamation Service by Mr. Goyne Drummond, whose report is extracted at pages 631–634 of the Third Annual Report.

In the fall of 1916 an examination of the Riverton project was made by Mr. John T. Whistler, whose report was published as "House Document No. 1767, Sixty-fourth Congress, second session." This document, which will hereafter be referred to as the Whistler report, contains illustrations, drawings, and much valuable information, which has been freely used in the preparation of this report. Reference should be made to it for a more detailed early history of the project.

PRESENT INVESTIGATIONS.

The Indian appropriation act provided $5,000—

> to enable the Secretary of the Interior to make such additional surveys and examinations as may be required for the purpose of preparing and submitting with the estimates to be submitted before the first regular session of the Sixty-fifth Congress of an estimate for the beginning of construction of a project for the watering of a portion of the conditionally ceded lands of the Wind River Reservation, in substantial accordance with the plan outlined in House Document numbered Seventeen hundred and sixty-seven of the Sixty-fourth Congress, second session, or such modification of such plan as the said Secretary may approve.

This appropriation became available July 1, 1917, and preparations were made for taking up the work at once.

Mr. A. T. Strahorn of the Bureau of Soils, United States Department of Agriculture, was given charge of the soil examination and Mr. James McKittrick, assistant engineer of field surveys, assisted by an instrumentman, rodman, axman, and laborers. Camp was established at Pavillion on July 25 and field work was in progress from that time until October 26, 1917. Many trial lines were run and topography of the principal canal lines taken.

Mr. D. W. Murphy, drainage engineer of the United States Reclamation Service, made an examination and report on drainage. Except for the hasty reconnaissance of the territory under the Fremont Canal, referred to in preceding pages, the present investigations were confined to the area that can be supplied with water from gravity canals in what has been designated as the second unit of the project. There is a quantity of good land lying above these canals that can only be reached by pumping, but the high lift required to cover any considerable acreage makes the cost of reclaiming them prohibitive.

CLIMATE.

The nearest Weather Bureau stations are located at Lander, Riverton, and Arapahoe in the Wind River Valley and at Thermopolis on the Big Horn River. For these stations, from information furnished by the Weather Bureau at Cheyenne, the Whistler report gives available data, to which may be added the following to bring them up to date:

TABLE 1.—*Temperature and dates of killing frosts.*

Station.	Year.	Temperature.				Killing frosts.	
		Maximum.		Minimum.		Last in spring.	First in fall.
		°F.	Date.	°F.	Date.		
Lander	1916	96	July 5	−34	Jan. 20	May 23	Sept. 11
	1917	96	July 22	−34	Jan. 22	June 13	Sept. 26
Thermopolis	1916	104	July 6	−33	Jan. 29	June 7	Sept. 11
	1917	106	July 22	−30	Jan. 22	June 1	Sept. 26
Kinnear [1]	1916	94	July 5	−36	Jan. 29	June 5	[2]Sept. 15
	1917	97	July 27	−30	Jan. 22	([3])	([3])

[1] The station designated as Kinnear is located on the river about 15 miles above Kinnear, at the premises of Mr. John C. Hays. Kinnear is now Pilot post office.

[2] 32°; no frost record.

[3] Freezing temperature occurred every month of 1917.

The inhabitants of the region fix the dates of the last killing frost in the spring between April 20 and May 15 and of the first killing frost in the fall between September 10 and October 1.

TABLE 2.—*Monthly and annual mean precipitation.*

	Lander 1891–1909.[1]	Riverton 1907–1909.[2]	Thermopolis 1899–1902 and 1907–1909.[3]
January	0.40	0.03	0.14
February	.65	.10	.54
March	1.68	.38	.66
April	2.30	.78	2.14
May	2.46	2.42	2.84
June	1.13	1.30	1.37
July	.77	.39	.26
August	.68	.90	.53
September	.89	.46	1.01
October	1.24	.40	.90
November	.64	29	.21
December	.84	.32	.69
Annual	13.68	7.77	11.29

[1] Records complete with the exception of January to July inclusive, 1891.

[2] No records in April, July to September, November and December, 1909.

[3] No records January to September, 1899; December, 1900; January, 1901; and January to October, 1907.

For the years above, at Lander, the annual precipitation varied from 10.15 inches in 1899 to 19.22 inches in 1908, with the exception of 1902, in which year it was 7.25 inches.

For the years above, at Riverton, the annual precipitation was 5.29 inches in 1907, and 12.04 inches in 1908.

For the years above, at Thermopolis, the annual precipitation varied from 10.36 inches in 1909 to 15.67 inches in 1908 with the exception of 1902, in which year it was 16.68 inches.

TABLE 3.—*Monthly and annual precipitation in inches.*

[T indicates amounts too small to measure.]

	Arapaho.		Lander.		Thermopolis.	
	1916	1917	1916	1917	1916	1917
January	0.52	0.14	1.03	0.74	0.33	0.06
February	.08	.40	.40	.89	.54	.33
March	.21	.54	1.62	.72	.77	.95
April	.55	1.32	.62	2.42	1.01	2.18
May	.42	5.14	1.51	5.26	.64	5.13
June	.19	.25	.19	.13	.46	.87
July	.31	0	.33	T.	.32	.02
August	.42	.33	.27	.31	.35	.10
September	.26	.32	.13	.05	.40	.89
October	.68	.39	1.96	.81	1.42	1.14
November	.16	.80	.82	1.10	.69	.45
December	.74	.23	1.37	.42	.58	.22
Annual	4.54	9.86	10.25	12.85	7.51	12.34

The prevailing winds are from the north and west.

CROPS.

No farming has been attempted on any of the land that it is proposed to irrigate, but the staple crops raised under the canals about Riverton are alfalfa, oats, wheat, potatoes, sugar beets, and the vegetables adapted to this climate.

Alfalfa yields from 3 to 4 tons per acre, oats from 20 to 30 bushels on new land and 75 bushels on alfalfa land; wheat, 15 bushels on wild land and 40 bushels on land that has been subdued. Potatoes return from 150 to 200 sacks per acre. Sugar beets were first raised in 1917 and averaged a little over 8 tons to the acre.

TRANSPORTATION.

The nearest shipping points are Riverton and Shoshoni, on the Wyoming & Northwestern Railway, and Bonneville, on the Chicago, Burlington & Quincy Railroad. From the geographical center of the project Riverton is about 14 miles, air line, to the southeast; Shoshoni and Bonneville are located east of the Big Horn River, some 16 or 18 miles away.

SETTLEMENT.

With the exception of two cattle ranches on Muddy Creek, the only people living upon the contemplated project are the four inhabitants of the town site of Pavillion. There are numerous claim shacks and a few fairly good houses scattered over the whole area, but they have all been uninhabited for years.

LAND.

The land is generally rolling, with flats or smooth areas of considerable extent along Five Mile Creek, in the depression lying south of Five Mile and west of Lost Wells Butte, and on the mesas between Cottonwood and Five Mile Creeks. The surface waters of the southwestern portion of the project collect in local depressions or "sinks," some of which it will be found impracticable to drain. An examination of the largest of these "sinks" discloses the fact that a ditch 4½ miles long, having a maximum depth of 47 feet and an average cutting of 28 feet, will be required to keep it dry.

The remainder of the project drains through a number of creeks and gulches into the Big Horn River.

The general slope of the country is from west to east, with an average fall of 25 feet to the mile.

Above the general surface numerous sandstone and shale buttes, ranging in size from one to several hundred acres, rise abruptly to heights varying from a few feet to a hundred or more feet above the general level. In the northern and northeastern sections miniature "bad lands" are found, and sandstone ledges of small areas outcrop at various points.

Topographically the land under the proposed canals may be classified as follows:

	Acres.
High, rough, and stony	51, 235
Rolling	52, 765
Slightly rolling	36, 700
Smooth	46, 640

In the above classification the rough land includes all buttes, sandstone ledges, and "bad lands" and is entirely nonagricultural, while the other classes are generally susceptible of irrigation, so far as their contour is concerned, though it will be seen later that the area given under the last three headings is considerably reduced on account of soil, drainage, and other conditions.

The ownership of the project lands is divided as follows:

	Acres.
Public	146,100
Private	40,320
Indian allotments	920

All of the public lands are now withdrawn from entry under the Carey Act, but a portion of them are covered by uncanceled homestead filings.

Most of the private lands are held in tracts of 160 acres or less, but 2,000 or 3,000 acres are in larger holdings. The largest area in one ownership is said to be 800 acres.

Raw land about Pavillion is valued at from $8 to $12 per acre, depending upon quantity and improvements. Under the canals near Riverton unimproved land sells at from $50 to $60 per acre, with water right, and improved land at from $80 to $150 an acre. Water rights under the LeClair-Riverton No. 2 ditch are sold for $25 an acre.

SOIL.

At least two soil examinations have been made. Messrs. Knight and Fitterer, of the Wyoming Agricultural College, conducted a "reconnaissance soil survey" in 1916, and their findings were published in the Whistler report.

During the summer of 1917 Mr. A. T. Strahorn, of the Bureau of Soils, United States Department of Agriculture, made a more extensive soil survey of the project. From his report the following tables have been compiled:

TABLE 4.—*Classification of soils (under gravity canals).*

CLAY SOILS.

Type No.	Character.	Depth.	Surface.
6	Heavy compact clay	6 feet or more	Flat or hummocky.
7	Silty clay loam	do	Smooth or gently rolling.
9	Heavy clay loam	12 to 24 inches.	Gently rolling.

LOAMS.

Type No.	Character.	Depth.	Surface.
1	Light loam with gravel	12 to 36 inches.	Smooth.
5	Medium textured loam	5 feet or more	Do.
8	Light textured loam	12 to 24 inches.	Smooth or gently rolling.

SANDY SOILS.

Type No.	Character.	Depth.	Surface.
3	Fine compact loam	1 to 6 feet	Rolling.
4	Sandy loam	6 feet or more	Smooth or gently rolling.

STONY SOILS.

Type No.	Character.	Depth.	Surface.
2	Rough and rocky		Broken.

TABLE 4.—*Classification of soils (under gravity canals)*—Continued.

CLAY SOILS.

Type No.	Vegetation.	Drainage.	Alkali.	Crops adapted to.
			Per cent.	
6	Greasewood	Poor	Over 0.4	None.
7	Salt sage and weeds	Fair	0.2 to 0.4	Grains, alfalfa, sugar beets.
9	do	Poor	0.2 to 0.4	Grains.

LOAMS.

Type No.	Vegetation.	Drainage.	Alkali.	Crops adapted to.
1	Black sage and grasses	Good	Less than 0.2	Grains and alfalfa.
5	do	do	Less than 0.2	Do.
8	Black and salt sages, etc	Fair	Less than 0.2	Grains, alfalfa, sugar beets.

SANDY SOILS.

Type No.	Vegetation.	Drainage.	Alkali.	Crops adapted to.
3	Black and salt sages, etc	Good	Less than 0.2	Grains and alfalfa.
4	Black sage and grasses	do	Less than 0.2	Do.

STONY SOILS.

Type No.	Vegetation.	Drainage.	Alkali.	Crops adapted to.
2				None.

TABLE 5.—*Classification of soils—Areas (under gravity canals).*

Type No.	Stony soils.	Clay soils.	Loams.	Sandy soils.
	Acres.	*Acres.*	*Acres.*	Acres.
1			435	
2	51,235			
3				30,665
4				26,390
5			7,925	
6		2,100		
7		41,485		
8			3,065	
9		24,040		
Total	51,235	67,625	11,425	57,055

Grand total, 187,340 acres.

IRRIGABLE AREA.

Referring to Table 4, it will be noticed that some of the soils are shallow in places and that types Nos. 2 and 6 are entirely nonagricultural. The percentage of alkali in types Nos. 7 and 9 ranges from 0.2 to 0.4 of 1 per cent, and the drainage possibilities in types Nos. 7, 8, and 9 are either poor or only fair. On account of these conditions, Mr. Strahorn concludes that the following deductions must be permanently made from the total area of the project:

	Acres.
For rough and stony ground	51,235
For poor soils	5,920
For lack of drainage and excess alkali	4,770
Total	61,925

He also recommends the temporary exclusion of the following areas until a comprehensive drainage system has been installed:

	Acres.
For poor soils	5,440
For lack of drainage and excess alkali	13,490
Total	18,930

These figures can be considered only as approximate, but it is believed they are as nearly correct as can be obtained until detail topographic, soil, and drainage surveys are made.

From the figures already given, the following estimate of area has been made:

Irrigable and nonirrigable areas.

		Acres.
Gross area of project		187,340
Permanently nonirrigable:		
Rough, high, and stony ground	51,235	
Poor soils	5,920	
Lack of drainage and excess alkali	4,770	
		61,925
Maximum irrigable area		125,415
Temporarily nonirrigable:		
Poor soils	5,440	
Lack of drainage and excess alkali	13,490	
		18,930
Probable irrigable area		106,485

An area of 100,000 acres has been assumed as a basis for estimating water and storage demands and in calculating the required capacities of canals. Such irrigable area is classified as follows:

	Acres.
Clay soils	45,600
Loam soils	8,800
Sandy soils	45,600

WATER SUPPLY.

The source of water supply for this project is the Wind River, which rises on the southern slopes of the Shoshone Mountains and on the eastern slopes of the Wind River Range. Its principal tributaries are Bear, Dinwoodie, and Bull Lake Creeks. From its source, Wind River flows in a southeasterly direction for about 100 miles to near the town of Riverton where it unites with the Popo Agie to form the Big Horn River.

Daily discharge records for both the Wind and Big Horn are available for portions of the years 1911 to 1916, inclusive. The records for 1913 and 1914 are given in the reports of the State engineer of Wyoming; those for all other years in the Water-Supply Papers of the United States Geological Survey. The discharge measurements of the Big Horn River for 1917 to September 30, were secured, but those for Wind River could not be obtained, as changes in the river bed rendered them unreliable. The gauging station on the Wind River is located a few miles above its mouth and the discharges reported show the flow of the river after practically all diversions have been made. The gauge on the Big Horn River is located at Thermopolis, some 75 miles below the mouth of Wind River.

In addition to records mentioned above, there are found in the Water-Supply Papers estimated monthly discharges of the Big Horn River for the years 1901, 1903, 1904, and 1905, and Mr. Whistler reports similar estimates by Mr. Lloyd for the years 1900 and 1902. On the Wind River there are estimated monthly discharges for the years 1906, 1907, and 1908.

All these data, except for 1917, are given in graphic or tabular form in the Whistler report.

WATER REQUIRED FOR PROJECT.

The duty of water delivered to the land is assumed to be:

	Acre-feet.
For clay soils	2
For loam soils	2.5
For sandy soils	3

Combining these figures with those given above we obtain the following:

Duty table.

		Acre-feet.
Clay soils	45,600×2	= 91,200
Loams	8,800×2.5=	22,000
Sandy soils	45,600×3	=136,800
All soils	100,000	250,000
Average duty		2.5

Allowing 40 per cent for losses in canal and lateral system, we have a gross demand for 417,000 acre-feet.

PRIOR WATER RIGHTS.

The constitution of Wyoming declares the waters of all natural streams and lakes to be the property of the State and places their supervision, appropriation, distribution, and diversion in the hands of a board of control composed of the State engineer and superintendent of water divisions.

Appropriations for irrigation purposes are limited to 1 second-foot for each 70 acres of land irrigated. An appropriation is initiated by filing an application with the State engineer giving the name of the stream from which water is to be taken, location of headgate and number of acres to be irrigated. A permit is issued requiring work to begin within one year and fixing a time for its completion, not exceeding five years, and an additional time in which to put the water to a beneficial use. These time limits all expire on December 31 of the year named, but the time may be extended by the State engineer.

An appropriation is completed upon proof of beneficial use by the claimant and the issuance of a certificate by the board of control. Previous to 1917, there was no law requiring the appropriator to make proof and have a certificate of appropriation issued but that year the legislature passed a law which requires the making of proof within two years after completion of the use of water and in the case of the older rights, proof must be made within two years from the date of the approval of the act by the governor. It is the practice of the State engineer's office to send notices of expiration in October of each year to the holders of all permits that expire on December 31 of that year. The claimant must either report his project completed or ask for an extension of time, otherwise his permit will be canceled.

In conformity with this procedure, the appropriations that affect this project have been tabulated under three heads: "Adjudicated," those upon which proof has been made, "Completed," those reported to have been finished but on which no proof of area reclaimed has been submitted, and "Uncompleted" all appropriations covered by permits that have neither been adjudicated, completed or canceled. All appropriations from the Wind and Big Horn Rivers (to the Montana line) up to September 15, 1916, are tabulated in the Whistler report, and omitting those relating to this project, are summarized below. The priorities for the Riverton project bear date of August 7, 1906; therefore, the tabulations given have been divided in order to separate the appropriations prior to that date from those subsequent.

TABLE 6.—*Priorities.*

[Equivalents in second-feet; 1 second-foot = 70 acres.]

	Adjudicated.		Covered by permit.	
	Covered by permit.	Adjudicated.	Completed.	Uncompleted.
WIND RIVER.	*Acres.*	*Sec.-ft.*	*Acres.*	*Acres.*
Dated prior to Aug. 7, 1906	4,795	48.65	17,337	32,400
Equivalents	68.50	48.65	247.67	462.86
Dated subsequent to Aug. 7, 1906	1,466	17.57	17,383	11,553
Equivalents	20.94	17.57	248.33	165.04
Total	6,261	66.22	34,720	43,953
Equivalents	89.44	66.22	496.00	627.90
BIG HORN RIVER.				
Dated prior to Aug. 7, 1906	41,219	156.53	52,170	....
Equivalents	588.84	156.53	745.29	....
Dated subsequent to Aug. 7, 1906	45	0.31	5,441 [1] 17,007	36,061
Equivalents	0.64	0.31	77.73	515.16
Total	41,264	156.84	57,611	36,061
Equivalents	589.48	156.84	823.02	515.16
Grand total	47,525	223.06	92,331	80,014
Equivalents	678.92	223.06	1,319.02	1,143.06

[1] Included in the 52,170 acres above.

Unfortunately this tabulation does not furnish reliable information as to the priority rights in either the Wind or Big Horn. Under "adjudicated" rights, it shows that the permits issued would require (on a basis of 70 acres to the second-foot) 678.92 second-feet of water, but that only 223.06 second-feet have been adjudicated. The natural conclusion would be that prior claims to 455.86 second-feet of water had been relinquished upon adjudication, but such is not the case. Under date of September 20, 1917, the State engineer wrote:

> Replying to your letter of September 15 regarding the tabulation of water rights on Big Horn River and Wind River would state that regarding the difference between the adjudicated rights and the rights under the same permits not adjudicated, it is impossible to state the exact amount which is in good standing of these unadjudicated rights. In the case of the earlier priorities it is probable that these permits were perfected only for the amounts adjudicated, the remaining acreage having been abandoned. With the later priorities there is the possibility that the remaining acreage is still in good standing and that the applicants have failed to make final proof.

For the "completed" claims it would require 1,319 second-feet of water to irrigate the area given in the permits. It is believed that this amount is excessive and this belief is sustained by considering permits Nos. 3856 and 7609, both issued for the Hanover Canal from the Big Horn River.

Permit No. 3856 is dated April 9, 1904, covers 35,000 acres and is reported "completed", Permit No. 7609 is dated December 10, 1906, covers 17,007 acres, and bears the notation "completed, amended 3856". Quoting from the State engineer's letter of September 20:

> Regarding permits 3856 and 7609, would state that it is apparent from permit No. 3856 that immense areas lying above the ditch were included in the 35,000 acres. Permit 7609 appears to be an amendment made for the purpose of accurately defining the lands to be irrigated under that canal, and the claim is therefore good for probably only 17,007 acres, under the two permits.

In all probability the "uncompleted" appropriations are for greater areas than will ever be reclaimed. It is evident from the foregoing that no accurate statement of the amount of water required by existing priorities can be given at this time.

WATER AVAILABLE.

Attention has already been called to the meager data of river discharge and priority demands, upon which all estimates of water supply are based.

The estimated demand curves for the early priorities from Wind River; for those priorities plus the requirements of this project; for the demands of this project and the priorities in both the Big Horn and Wind Rivers have all been platted on hydrographs. Examination of these diagrams shows that, considering the Wind River only, the priorities from that stream are fully provided for by its natural flow, but that there would not be sufficient water in the river any year to supply this project in addition to prior claims. The periods and amounts of the shortages that would have occurred during the years 1911–1916, inclusive, are shown in the table following.

TABLE 7.—*Estimated storage required for Wind River to supply project requirements and Wind River priorities.*

[Quantities in acre-feet.]

Month.	Year.					
	1911	1912	1913	1914	1915	1916
April	No record	....	....	1,880	....	....
May	....	21,100	1,950	8,950	3,040	2,420
June	....	....	....	....	....	....
July	5,940	8,550	3,370	28,500	47,500	8,990
August	18,800	7,550	2,260	13,300	24,800	15,800
September	10,300	....	....	1,680	....	8,800
Total	35,040	37,200	7,580	54,310	75,340	36,010

It is evident from a study of this table that the water needed for this project can not be supplied by Wind River without providing storage facilities that can be drawn upon during periods of low flow.

STORAGE REQUIRED.

Daily discharge records are available only for portions of the years 1911–1916 for the Wind River and for the Big Horn River for the years 1911–1917.

An inspection of the hydrographs for the years 1913 and 1914 shows them to be inconsistent and unreliable, leaving but four years upon which to base an estimate of the storage required. The present appropriations from the Big Horn River have prior claims on the flow of Wind River to those for this project so that any deficiency caused by its construction must be made good. To approximate this deficiency, the discharges recorded at Thermopolis have been reduced by the amounts needed to supply the Wind River priorities and the requirements of the project when there was sufficient water in Wind River to supply the above requirements. When the flow in Wind River was insufficient to supply the above requirements, only the total Wind River flow has been deducted from the flow in the Big Horn River. The remainder of the flow in the Big Horn obtained in the respective cases has been assumed to be the amount of water available in the Big Horn River to supply its priorities. When this remainder was less than the amount required by these priorities, the deficiency resulting has been considered as the storage required to be supplied for the Big Horn, provided the latter was less than the natural flow of the Wind River, which it was in all cases. As the discharges recorded at Thermopolis give the flow in the Big Horn after the water now used for irrigation has been diverted from the river and its tributaries (including Wind River), above that point it is believed that there need be no allowance made for losses in transit.

The following table gives the periods and amounts of shortages in the Big Horn as determined by the method outlined above:

TABLE 8.—*Estimated storage required to be furnished for Big Horn River to supply Big Horn River priorities after using Wind River flow to supply project and Wind River priority requirements.*

[Quantities in acre-feet.]

Month.	Year.					
	1911	1912	1913	1914	1915	1916
April			No record			
May	5,650	1,430	No record			
June						
July	24,900	5,820	33,500	79,800	3,050	12,900
August	28,200	4,030	30,400	28,800		11,300
September	10,800		1,840	7,110		4,770
Total	69,550	11,280	65,740	115,710	3,050	28,970

Combining tables 7 and 8 gives the following:

Table 9.—*Estimated total storage required for project, Wind River priorities, and Big Horn River priorities.*

[Quantities in acre-feet.]

Month.	Year.					
	1911	1912	1913	1914	1915	1916
April				1,880		
May	5,650	22,530	1,950	8,950	3,040	2.420
June						
July	30,840	14,370	36,870	108.300	50,550	21,890
August	47,000	11,580	32,660	42,100	24,800	27,100
September	21,100		1,840	8,790		13,570
Total	104,590	48,480	73,320	170,020	78,390	64,980

Disregarding the years 1913 and 1914 we have a maximum storage demand of 104,590 acre-feet in 1911.

STORAGE AVAILABLE.

Table 10 shows the quantities of water available from the Wind River for storage, obtained by deducting the quantities assumed to be needed for irrigation from the recorded flow of the river.

Table 10.—*Storage available from Wind River.*

[Quantities in acre-feet.]

Month.	Year.								
	1906	1907	1908	1911	1912	1913	1914	1915	1916
January	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
February	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
March	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	26,100
April	(1)	(1)	(1)	(1)	1,040	17,300	4,110	22,700	15,900
May							94,300	18,300	21,200
June	132,000	(1)	125,000	287,000	218,000	249,000	138,000	27,200	146,000
July								4,200	
August									
September								44,400	
October	(1)	45,000	55,900	32,600	44,000	36,900	42,900	41,000	(1)
November	(1)	33,300	(1)	8,800	(1)	(1)	(1)	(1)	(1)
December	(1)	38,700	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Total	132,000	117,000	180,900	328,400	263,040	303,200	279,310	157,800	209,200

[1] No record.

It will be noted that the discharge records are incomplete and only cover a fraction of each year, but in spite of that fact the table indicates that there is ample water to meet all storage necessities.

RESERVOIRS.

Appropriations of storage water have been made for this project as follows:

Reservoir.	Supply.	Capacity.
		Acre-feet.
Pilot Butte	Wind River	34, 200
Bull Lake	Bull Lake Creek	74, 980
Dinwoodie	Dinwoodie Creek	22, 800
Dry Lake	Dry Creek	2, 300
Lost Wells No. 1	Wind River	610
Lost Wells No. 2	.....do	600

Only the first two of these reservoir sites are considered in this report.

Pilot Butte Reservoir is located on the line of the "Wyoming Canal," some 10 miles from its intake, and would be supplied through it. Profiles of the dam sites and outlet have been made and used in estimating the cost of the reservoir. With the water surface at elevation 5460 a capacity curve gives 34,000 acre-feet of storage.

Bull Lake Reservoir is located on Bull Lake Creek about 3 miles above its mouth. This site was examined but no survey made other than that by the Arnold Engineering Co. Their map shows an area of approximately 2,450 acres and a capacity of 78,750 acre-feet. Two earth dams will be required aggregating 2,300 feet in length at the crest, with a maximum height of 50 feet.

Unfortunately there are only a few miscellaneous records of the discharge of Bull Lake Creek, the only source of supply for this reservoir. On August 22, 1904, Mr. Drummond found 499 second-feet flowing in Bull Lake Creek and the Geological Survey reports the following measurements in 1909:

	Second-feet.		Second-feet.
January 18	81	June 14	827
March 12	54	June 29	3, 105
April 6	39	August 12	1, 309
May 16	94	August 27	730

A hydrograph prepared by the Arnold Co. shows the comparative discharges of Wind River and Bull Lake Creek for a part of the year 1908. From this it appears that about 30 per cent of the total flow of the river comes from Bull Lake Creek. The farmers living in the neighborhood state that one-third of the river flow is supplied by the creek.

From personal observation it is believed that not less than 20 per cent of the river discharge is furnished by Bull Lake Creek. On that assumption, the following amounts of water could have been stored in Bull Lake Reservoir:

	Acre-feet.		Acre-feet.
1911	92, 900	1914	93, 800
1912	80, 400	1915	70, 200
1913	92, 600	1916	80, 400

DRAINAGE RECONNAISSANCE.

(By D. W. Murphy, drainage engineer.)

To determine the probability of seepage occurring under irrigation, and to give a tentative estimate of the cost of drainage works that will be required an examination has been made of the lands irrigable from the canals now suggested. In this connection the report of Mr. A. T. Strahorn on the soils was considered. An examination was also made of lands already under irrigation and lying adjacent to Wind River both above and below the town of Riverton. On these lands considerable areas are seriously affected by seepage, especially adjacent to Wind River near the town of Riverton and on the reservation lands adjacent to Little Wind River. No direct comparison can be made between these lands and those of the project on account of differences in soil conditions. The lands above mentioned, where seepage has already appeared and is increasing, are all underlaid by gravel subsoils. On the project lands gravel is absent. This fact does not argue that lands adjacent to the river are more susceptible to seepage or that the absence of gravel on the project lands is an assurance that seepage will not occur.

Data relative to depths of soils and the presence of rock and shale were gotten largely from surface outcrops and washes. This is not sufficient to segregate the areas where rock or shale is near enough to the surface to make seepage conditions dangerous. To do this would require exhaustive investigation and the putting down of numerous test pits or borings over the entire area. The observations were sufficient to show that rock or shale is relatively near to the surface on portions of all the lands except some high mesa areas in the eastern portion, and in the valleys of Five Mile and Muddy Creeks.

The topography of the project is generally rough; the irrigable portions consist, in large part, of valleys or slopes bounded wholly or in part by rough or rocky areas. The general slope of the lands is from west to east. The average fall of the two principal waterways across the project, Five Mile and Muddy Creeks, is about 25 feet per mile. In the eastern portion of the project there are two mesa areas—one located to the north and the other to the south of Muddy Creek, which contain several thousand acres of relatively level lands. In the southern portion and along Five Mile and Muddy Creeks there are considerable areas of comparatively smooth slopes. In the western portion and lying south of Five Mile Creek there is one large depression area or sink. The lowest point of the flat ridge which bounds this depression on the east is from 40 to 50 feet above the lowest lands in the sink. The exact area included within this sink can not be determined with the data now available. It apparently includes an area from three to four miles square.

Preliminary investigations that have been made show that the drainage of the area within this sink would be difficult and expensive. It is probable, however, that a portion of the lands within the depression can be protected by utilizing the bottom of the sink for storage and evaporation of drainage waters.

The entire project so far as can be determined is underlaid with shale. On the higher ridges and mesas and in some places in the floor of the valleys this shale is capped by sand rock. To determine just what areas are underlaid by sand rock would require extensive investigations as there is a great variation in its height in different portions of irrigable area. In several instances it was found in shallow washes in low valleys and in one or two cases in the bed of Five Mile Creek.

The soils of the project are the result primarily of decomposed sand rock and shale and vary from almost pure sand on the mesas and some high areas to a heavy almost pure clay in the lower depressions. This clay is the result of disintegrated shale. Along the slopes sand and clay have become mixed so as to form more or less light textured loams. Mr. Strahorn in his report states, with few exceptions, that drainage will ultimately be required for all of these heavier soils. He also calls attention to the fact that irrigation on the lighter textured sand and loam soils is likely to cause an excess of water to reach the lower areas. That this is likely to happen has been shown by the irrigation of land of similar character in various places.

The soils of the project as heretofore stated are all underlaid with a sand rock or shale. On the mesa lands in the eastern portion of the project, which amount to several thousand acres, rock is apparently deep enough to prevent its holding up ground waters sufficiently near to the surface to do damage. This is probably the case also in the middle or lower portion of the valleys of Five Mile and Muddy Creeks. On other portions of the project rock is frequently found sufficiently near the surface to seriously interfere with natural drainage conditions. In several places where soil conditions, judging from surface indications and natural vegetation, are apparently good, examinations made in the bottom of washes have revealed the presence of sand rock or shale at depths of 4 feet or less below the surface.

The conditions which may lead to serious seepage and drainage difficulties on a large portion of the project are: (1) The presence of impervious strata of sand rock or shale at shallow depths below the surface; (2) the presence of light textured sand and loam soils on the higher areas which through losses from canals and excessive irrigation may contribute excessive water to the heavier lands below; (3) the fine textured nature and impervious character of some of the soils will cause high capillary action. This together with the lack of impervious strata below may make it necessary to construct drains at frequent intervals in order to maintain the water table at a safe depth below the surface.

Where rock or shale is within a few feet of the surface any excessive water in the soil can not pass downward but must travel laterally over the surface of the rock. The general experience is that ground water will travel down slopes along the surface of rock in sufficient quantities to do damage. Where the underlying material consists of shale the top portion is generally sufficiently fissured to permit a considerable movement of water through it. In shallow soils underlaid by impervious rock strata there is little or no storage capacity for excess water which enters them either from canal losses or over irrigation. Where these conditions exist it is generally necessary to construct frequent drains in order to carry out the water and prevent its spread laterally. On the narrow areas, many of which exist in the upper portion of the project, it will probably be necessary to build a drain on either side in order to prevent the movement of water down the slopes onto them.

It is impossible with the data at hand to attempt to lay out such a system of drains as may be required. Before this is done, and before a decision is reached as to whether certain of the lands of the project can be protected from seepage and their irrigability maintained, further investigations should be made. These investigations should include both the topographic and subsoil conditions. A contour map, with contour intervals not to exceed 5 feet on the steeper slopes and perhaps one-half of this amount on the valley floor, is necessary to determine where drains can be advantageously projected. Subsoil examinations by means of borings or test pits are necessary to determine the presence of and depth to impervious rock or shale. With these data it will be possible to form some idea of where seepage will probably occur and to outline a tentative system of drains for taking care of it.

Any estimate with the data now available must be regarded as an expression of judgment based upon somewhat similar conditions that have been found on other irrigated lands. Conditions on the project lead to the conclusion that seepage may be expected to occur over a large part of the irrigable area and that a comprehensive drainage system will be necessary to maintain the irrigability of the lands. The amount of drainage work required will depend, in a large degree, upon the exclusion from the irrigable areas of lands which it is evident will become seeped and whose drainage will be unusually difficult. This applies especially to lands where impervious rock or shale is found at shallow depths below the surface and to narrow areas which will require one or more drains throughout their entire length for their protection. A comparison of conditions on the Riverton project with those which exist on other projects where seepage has occurred and where drainage works have been built leads to the conclusion that a system sufficient to maintain the irrigability of lands will cost at least $15 per acre for the entire irrigable acreage. This is on the assumption that the irrigable lands be carefully selected and that all areas which are likely to present unusual drainage difficulties be excluded.

It is recommended before definite conclusions are reached relative to lands to be included in the project that a topographic survey be made and map prepared, that an examination be made of subsoil conditions to serve as a basis for determining the probable effect of applying water to the lands, and that a tentative drainage system be outlined and an estimate of the cost thereof prepared.

CONSTRUCTION FEATURES.

In addition to Pilot Butte and Bull Lake reservoirs the principal construction features would be the diversion works on Wind River, the Wyoming, Pavillion No. 1, Pavillion No. 2, Pilot and Lost Wells Canals, and the Dry Muddy, Five Mile, Muddy, North Sand Gulch, South Sand Gulch, "A" and "B" laterals.

In computing canal sections the following elements have been assumed:

Elements.	Earth sections.	Lined sections.
Coefficient of roughness "n"	0.0225	0.014.
Velocity in feet per second "v"	2.4 feet to 2.6 feet.	8 feet and over.
Side slopes "s. s"	1½:1	1:1 and ½:1.

A driveway is contemplated on the lower bank of all the larger canals. Canal banks are raised from 2 to 3 feet above the maximum water level, depending upon the size of the channel. Lined sections are intended to be from 6 to 8 inches in thickness. Excess fall should be provided for by lined sections wherever possible.

Diversion works.—The topography of the diversion site was taken and a general sketch prepared of dam and headworks. This contemplates a concrete weir across the river channel 490 feet in length with a crest elevation of 5,565 at the end of the weir adjoining the canal headworks. Sluice gates are required to pass accumulations of sand and gravel and hold the channel on the north side of the river. At the south end of the weir an earth embankment 20 feet wide on top, with a slope of 3 to 1 on the upper side and 2 to 1 on the lower, is contemplated to extend across the bottom lands a distance of 1,930 feet, with crest at elevation 5,575. The upper slope should be riprapped.

Headworks of concrete, with ample gate room to feed the canal, would extend from the weir to the sandstone bluffs on the north side of the river. The gate seats would be placed at the elevation of the bottom of the main canal (5554), 2 feet above the floor of the sluice gates. Some 1,600 feet below the intake a sand trap with gates and sluiceway leading back to the river would be installed.

Main canal.—The Wyoming Canal would be the main artery of the distribution system, extending a little less than 31 miles from Wind River to a point near the line between sections 2 and 3, T. 3 N., R. 3 E., W. R. M., where it would branch into Dry Muddy and Five Mile laterals.

Three miles of concrete channel are required along the steep side hill separating the mesa from the river bottom lands. This section is entirely in excavation. Concrete flumes are required to cross Dry Creek and a larger gulch some two and a half miles east of the creek. Along the bluffs above the reservoir there would be 4,000 feet of lined section with wasteway and diversion works for filling the reservoir.

For the 9 miles from Pilot Butte to Pavillion, the capacity of the canal would be reduced. Just north of Pavillion 200 second-feet would be diverted into Pavillion Canal No. 2 and the remaining 1,380 feet dropped 143 feet in a lined section to elevation 5,400.

Five Mile Creek would be crossed in a concrete flume with wasteway at the upper end.

Topography was taken along the line of the Wyoming Canal and the principal laterals proposed and maps drawn to fix tentative location and approximate quantities of material to be moved. The principal construction features involved are listed in the table.

Laterals.—Pavillion Canal No. 2 would divert from the main channel about 19 miles below the intake and would serve some 10,000 acres north and east of Pavillion. It would have a bottom width of 14 feet, fall 1.32 feet per mile, and carry 200 second-feet of water.

TABLE 11.—*Principal features of proposed canal and main laterals.*

Canal or lateral.	Miles of channel.		Flumes.[1]		Highway bridges.		Culverts.		Concrete drops.	Head gates.
	Earth.	Lined.	Number.	Linear feet.	Number.	Linear feet.	Number.	Linear feet.		
Wyoming[2]	25.4	5.4	3	650	6	645	10	1,800	[3]1	
Pavillion No. 2	12.6		2	600	3	108	3	180	1	
Dry Muddy	20.0	1.5	6	900	3	160	2	100	51	
Five Mile	9.8	.7			1	40			30	
Muddy	10.5	.2			1	50			38	
Pilot[4]	21.6	.5			7	480	9	900	2	
Lost Wells	7.5		1	60	1	35				1
North Sand Gulch	6.5	.6			1	30			9	
South Sand Gulch	11.5	1.0			1	30	6	300	15	
Pavillion No. 1	18.0				2	60			50	3
Lateral A	5.0	.6			1	40			8	2
Lateral B	4.0				2	60			35	

[1] Concrete on Wyoming Canal; others metallic.
[2] Also 2 spillways.
[3] With division box.
[4] Also 1 division box.

ESTIMATES.

To satisfy the mandate of Congress and for use in further consideration of the project, the probable cost of its construction, with yardages of earth to be moved, etc., was set down in detail, but all these figures are subject to considerable change. Under present conditions costs generally are increasing rapidly. On this project, although two appropriations have been made for investigations, the amounts have been too small to permit the detailed investigations essential to accurate estimates of cost.

For example, no borings have been made at any of the dam or reservoir sites and the character of the foundations developed upon testing may radically modify any present estimates on those features.

Owing to distance of the work from shipping points, the scarcity and high price of both labor and material and the absence of sand, gravel, and water except at points near Wind River, the cost of constructing the project at this time would be much greater than under ordinary circumstances.

In attempting to approximate the probable cost, the classification of earthwork given in the standard specifications of the Reclamation Service has been used. It has been assumed that the cost of minor laterals and farm turnouts will amount to $5 per acre for the total area to be irrigated, and that of drainage $15 per acre.

A summary of the probable cost thus found is as follows:

PROBABLE COST OF CONSTRUCTING RIVERTON PROJECT.

Storage works:		
Bull Lake Reservoir	$470,000	
Pilot Butte Reservoir	344,310	
		$814,310
Diversion works:		
Dam, headworks, and appurtenances		297,500
Distributing systems:		
Wyoming Canal	1,852,150	
Pavillion Canal No. 1	101,075	
Pavillion Canal No. 2	94,420	
Dry Muddy lateral	500,200	
Five Mile lateral	164,670	
Muddy lateral	115,125	
Lateral A	61,250	
Lateral B	34,750	
Pilot Canal	578,325	
Lost Wells Canal	47,625	
North Sand Gulch lateral	51,375	
South Sand Gulch lateral	44,250	
		3,645,215

Miscellaneous:		
Drainage	$1,500,000	
Farm laterals	500,000	
Telephone lines	20,000	
		$2,020,000
Grand total		6,777,025
Should only 85,000 acres be reclaimed, the total given above may be reduced by the following amounts:		
For dams and dike at Pilot Reservoir	$229,000	
For reduced canal capacities (5 per cent)	182,000	
For drainage of 15,000 acres, at $15	225,000	
For farm laterals, 15,000 acres, at $5	75,000	
		711,000
		6,066,025

SUMMARY.

The following conclusions may be given, subject to modification with more detailed investigations and changing conditions, as noted above:

1. There are from 85,000 to 100,000 acres of irrigable land in the proposed project.
2. Detailed topographic, soil, drainage, and location surveys should be made before construction is begun.
3. All public lands within the project should be withdrawn from entry.
4. Between 40 and 50 per cent of the best lands of the project are in private ownership and, before any additional expenditures are made, should be obligated to pay their proportionate part of the cost of the project.
5. The present priority rights expire on December 31, 1918, and steps have been taken to have them extended.
6. The present gauging stations on Bull Lake and Dinwoodie Creeks, on Wind River near Riverton, and on Big Horn River at Thermopolis should be continued.

FINANCIAL STATEMENT.

Consolidated balance sheet, secondary projects, June 30, 1918.

ASSETS.		
Cash in special deposit account		$2,026.15
Inventory of stock on hand		1,622.56
Accounts receivable		1.12
Construction cost	$1,123,994.24	
Less revenues earned during construction	34,825.07	
Net cost of construction to date		1,089,169.17
Total		1,092,819.00
LIABILITIES, RESERVES, AND CAPITAL.		
Accounts payable		4,906.22
Guarantees and special deposits		2,026.15
Capital investment: Disbursement and transfer vouchers received	$1,228,358.23	
Less collections and transfer vouchers issued	142,471.60	
Net investment		1,085,886.63
Total liabilities and capital investments		1,092,819.00

Balance sheet, Washington office, June 30, 1918.

Cash in special deposit		$3,079.20
Inventory of stock on hand		43,711.06
Accounts receivable		5,560.12
Cost		23,079.67
Total		75,430.05
Accounts payable		9,601.61
Contingent obligations		3,079.20
Capital investment:		
Disbursement and transfer vouchers received	$3,886,159.93	
Collections and transfer vouchers issued	3,823,410.69	
Net investment		62,749.24
Total		75,430.05

Estimated cost of Washington and detached offices during fiscal year 1919.

Salaries and wages	$184,080.00
Books, stationery, printing, etc	52,000.00
Furniture and fixtures	1,900.00
Rental of offices	8,100.00
Telephone and telegraph services	1,500.00
Heat, light, and power	1,000.00
Traveling expenses	18,000.00
Photo work, blue printing, and drafting supplies	5,000.00
Engineering and survey instruments and supplies	2,000.00
Books, technical	1,500.00
Miscellaneous	2,000.00
Total	277,080.00

Balance sheet, Denver office, June 30, 1918.

Inventory of stock on hand		$4,434.59
Accounts receivable		3,405.15
Undistributed cost to date		26,440.29
Total		24,280.03
Accounts payable		16,589.51
Capital investment:		
Disbursement and transfer vouchers received	$553,685.75	
Collection and transfer vouchers issued	535,995.23	
Net investment		17,690.52
Total		34,280.03

Estimated cost of Denver office during fiscal year 1919.

Salaries and wages	$100,000.00
Books, stationery, printing, and office supplies	6,000.00
Furniture and fixtures, office	3,000.00
Rental of offices	5,000.00
Telephone service	600.00
Telegraph service	800.00
Traveling expense	12,000.00
Inspection, outside laboratories	11,000.00
Miscellaneous items	1,000.00
Total	139,400.00

Summary of general data for Garden City project to end of fiscal year 1918.

Finances:	
Net construction cost to end of fiscal year	$325,123.49
Per cent complete at end of fiscal year	100
Estimated total construction cost to June 30, 1919	$382,332.34
Appropriation, fiscal year 1918	1,000.00
Increase under 10 per cent provision of act	1,000.00
Expenditures during fiscal year, chargeable to 191- appropriation: Disbursements	303.87
Unencumbered balance, July 1, 1918	696.13

Feature costs of Garden City project to June 30, 1918.

Features.	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys		$7,618.72
Pumping for irrigation:		
Well pits and shafts	[1] $3,711.86	49,777.65
Pumping plants		51,694.13
	[1] 3,711.86	101,471.78
Canal system:		
Temporary structures		2,497.42
Concrete conduit		56,473.73
Bridge across conduit		150.30
Concrete culvert		97.76
Arkansas River siphon		26,785.15
Right of way fence		2,541.81
		88,546.17
Power system:		
Power house building and plant		81,666.37
Electrical installation		15,410.75
Soft water well, No. 1		1,219.37
Coal scales, trestle, and coal bins		5,445.08
Industrial and railroad track		1,556.30
Circulating 12-foot well		13,890.00
Soft water well, No. 2		1,073.71
Soft water well, No. 3		1,543.73
Cooling tower		1,714.24
Board of survey expense		474.14
		123,993.69
Farm units		285.66
Permanent improvements and lands:		
Real estate	546.43	1,895.66
Headquarters buildings		4,866.87
Lubricating oil house		374.85
Work shop		410.74
		7,548.12
Operation and maintenance during construction		48,405.87
Care of plant during nonuse	20.20	4,462.33
Gross construction cost	[1] 3,145.23	382,332.34
Less revenues earned during construction period:		
Rentals of buildings	30.00	1,009.58
Contractors freight refunds		1,911.73
Forfeitures by defaulting contractors		5,800.00
Other revenues unclassified	47,028.14	47,041.14
Profit on mess house operations		860.82
Profit on hospital operations		585.58
		57,208.85
Net cost of construction to June 30, 1918		325,123.49

[1] Deduct.

Summary of general data for Hondo project to end of fiscal year 1917.

Finances:	
Net construction cost to end of fiscal year	$371,868.70
Per cent complete at end of fiscal year	100
Repayments:	
Water-rental charges—	
Accrued to end of fiscal year	$9,163.66
Collected to end of fiscal year	8,929.67
Uncollected at end of fiscal year	233.99

Project balance sheet, Hondo project, June 30, 1918.

Accounts receivable		$233.99
Construction cost	$381,573.39	
Less construction revenue earnings	9,704.69	
		371,868.70
Total		372,102.69
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	407,745.12	
Collection, transfer, refund, and joint construction vouchers issued	35,642.43	
Net investment		372,102.69
Total		372,102.69

Feature costs, Hondo project, to June 30, 1918.

Features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys: Hondo Canal (Diamond A)		$4,422.70
Storage works:		
Storage reservoir and embankment		96,246.60
Outlet excavation and embankment		57,772.59
Protection embankment and outlet canal		825.48
		154,844.67
Canal system (diversion system):		
Headworks and earthwork inlet		58,362.38
Rock excavation for diversion		35,536.31
		93,898.69
Lateral system: Laterals and sublaterals		38,979.34
Farm units: Farm-unit subdivision		19,837.41
Permanent improvements:		
Real estate (reservoir site, etc.)		21,599.46
Buildings		1,738.99
		23,338.45
Telephone system		4,170.42
Operation and maintenance during construction (water-rental basis)	[1] $48.26	42,081.71
Gross construction cost to June 30, 1918	[1] 48.26	381,573.39
Less revenues earned during construction period:		
Rentals of buildings		286.00
Rentals of irrigation water		9,163.66
Contractors freight refunds		159,63
Other revenues, unclassified	24.00	149.90
Loss on hospital operations	[1] 54.50	[1] 54.50
	[1] 30.50	9,704.69
Net cost of construction of project to June 30, 1918		371,868.70

[1] Deduct.

Statement of cost by calendar years, Hondo project, New Mexico.

Year ending Dec. 31—	Construction.	Operation and maintenance during construction.	Total cost.
1903	$4,890.15		$4,890.15
1904	30,196.06		30,196.06
1905	160,368.14		160,368.14
1906	153,919.88		153,919.88
1907	9,339.40		9,339.40
1908	6,648.51	$6,369.07	13,017.58
1909	4,943.63 [1][2] 23,693.59	5,149.23	10,092.86 [1][2] 23,693.59
1910	4,521.08	4,521.08	9,042.16
1911	5,502.03	5,526.93	11,028.96
1912	4,085.69	4,085.69	8,171.38
1913	5,745.12	2,480.47	8,225.59
1914	[1] 26,974.42	3,514.95	[1][3] 26,974.42 3,514.95
1915		5,031.64	5,031.64
1916		4,483.98	4,483.98
1917		918.67	918.67
Total	339,491.68	42,081.71	381,573.39

[1] Deduct.

[2] Collection from bonding company.

[3] Transfer cost of operation and maintenance during construction.

Statement of cost by fiscal years, Hondo project, New Mexico.

Year ending June 30—	Construction.	Operation and maintenance during construction.	Total cost.
1904	$4,890.15		$4,890.15
1905	82,934.32		82,934.32
1906	239,502.12		239,502.12
1907	29,612.07		29,612.07
1908	1,227.78	$3,993.42	5,221.20
1909	830.67 [1][2] 23,693.59	5,022.77	5,853.44 [1][2] 23,693.59
1910	[1] 214.40	5,280.96	5,066.56
1911	[1] 62.05	3,464.08	3,402.03
1912	76.41	5,748.65	5,825.06
1913	2,564.03	2,986.41	5,550.44
1914	1,379.29	3,206.02	4,585.31
1915	444.88	5,083.51	5,528.39
1916		4,128.77	4,128.77
1917		3,215.38	3,215.38
1918		[1] 48.26	[1] 48.26
Total	339,491.68	42,081.71	381,573.39

[1] Deduct. [2] Collection from bonding company.

Summary of general data for Lawton project to end of fiscal year 1918.

Finances:	
Net cost to end of fiscal year	$13,852.91
Appropriated for fiscal year 1919, total	1,000.00
Allotment for fiscal year 1919	500.00
Proposed appropriation, fiscal year 1919	750.00
Estimated total cost to June 30, 1919	15,112.66
Appropriation, fiscal year 1918	101,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation: Disbursements	501.44
Unencumbered balance, July 1, 1918	100,498.56

Feature costs of Lawton project to June 30, 1918.

Features.	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys	$504.33	$9,166.27
Canal system:		
Diversion dam		293.80
Main canal		2,080.68
		2,374.48
Lateral system		1,118.83
Plant accounts	[1] 265.05	187.53
Undistributed general expense	[1] 22.57	1,015.55
Gross cost to June 30, 1918	216.71	13,862.66
Less revenues earned during construction period: Profit on hospital operations		9.75
Net cost to June 30, 1918		13,852.91

[1] Deduct.

Statement of cost by calendar years, Lawton project.

Year ending Dec. 31—	Construction.	Total cost.
1914	$5,830.30	$5,830.30
1915	2,339.98	2,339.98
1916	3,830.54	3,830.54
1917	1,535.21	1,535.21
January to June 30, 1918	326.63	326.63
Total	13,862.66	13,862.66

Statement of cost by fiscal years, Lawton project.

Year ending June 30—	Construction.	Total cost.
1914	$450.65	$450.65
1915	7,447.10	7,447.10
1916	1,748.89	1,748.89
1917	3,999.31	3,999.31
1918	216.71	216.71
Total	13,862.66	13,862.66

INDIAN IRRIGATION PROJECTS.

MONTANA, BLACKFEET (INDIAN) PROJECT.

R. M. Snell, project manager, Browning, Mont.

LOCATION.

County: Teton.

Townships: 31 to 34 N., Rs. 5 to 10 W.; 29 N., R. 8 W.; 30 N., Rs. 6 to 9 W.; and 35 N., Rs. 6 and 7 W., Montana meridian.

Railroad: Great Northern.

Railroad stations and estimated population June 30, 1918: Browning, 600; Blackfoot, 100; Bombay; Seville; Cadmus; Glacier Park, 100; and Cutbank, 1,200.

WATER SUPPLY.

Source of water supply: Two Medicine River, Cutbank, Badger, Birch, Whitetail and Blacktail Creeks.

Area of drainage basins: 1,700 square miles.

Annual run-off in acre-feet: Cutbank Creek at Cutbank (971 square miles), 1906 to 1917, maximum 212,600, minimum 73,000, mean 139,775. Two Medicine River at Family (368 square miles) 1907 to 1917, maximum 439,650, minimum 194,600, mean 273,837. (The records for Cutbank Creek and Two Medicine River are for the years ending September 30, and do not include the run-off during the winter months.) Badger Creek near Family (224 square miles) 1907 to 1916, mean 162,000. (The 1917 records for Badger Creek are incomplete.) Birch Creek at Dupuyer (155 square miles) 1907 to 1915, mean 106,250.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to furnish water, season of 1918: 48,240 acres.

Area under water-right (allottee's) applications, season of 1917: 3,931 acres.

Area under water rental applications, season of 1917: 280 acres.

Area irrigated, season of 1917: 2,448 acres.

Length of irrigation season: May 1 to September 30, 153 days..

Average elevation of irrigable area: 3,850 feet above sea level.

Rainfall on irrigable area: 1909 to 1917, average 14.07 inches; 1917, 13.73 inches.

Range of temperature on irrigable area: −56° to 100° F.

Character of soil of irrigable area: Principally rich sandy loam; some gravelly loam and gumbo.

Principal products: Hay, grain, and vegetables.

Principal markets: Great Northern Railway towns from St. Paul to the Pacific coast. Local demand for hay for stock feeding.

LANDS OPENED TO IRRIGATION.

No lands have been opened to irrigation by public notice. Nearly all lands covered by canals are allotted to Indians.

CHRONOLOGICAL SUMMARY.

Reconnaissance and preliminary surveys made in 1907.

Construction work on the Two Medicine unit begun in July, 1908.

Construction of Two Medicine Lake Dam begun in June, 1911; completed August, 1913.

Construction of the Badger-Fisher unit begun in June, 1911.

Construction of Birch Creek unit begun in August, 1915.

Two Medicine unit 34 per cent completed June 30, 1918.

Badger-Fisher unit, 49 per cent completed June 30, 1918.

Birch Creek unit, 77 per cent completed June 30, 1918.

Entire project 29 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Blackfeet project provides for five irrigation systems on the Blackfeet Indian Reservation, as follows: (1) The Cutbank north canal system heading on the left bank of Cutbank Creek and supplying water for 20,000 acres of land north and east of the creek. 11,000 acres of which are outside of the reservation; (2) the Cutbank south canal system heading on the right bank of Cutbank Creek and supplying water for 18,000 acres of land near Carlow and Seville stations on the Great Northern Railway; (3) the Two Medicine Canal systems, diverting from the left bank of the Two Medicine River and supplying water through the North Branch Canal, the Spring Lake Reservoir, and the South Branch Canal to 48,000 acres of land; (4) the Badger-Fisher Canal system, diverting water from the right bank of Badger Creek, supplying water direct through a feeder canal to 3,000 acres of land on the Piegan Flats and through the Four Horns supply canal and reservoir and the Fisher canal to 30,000 acres of land between Badger and Birch Creeks. and (5) the Birch Creek canal system, diverting from the left bank of Birch Creek and supplying water to 3,500 acres of land between Birch and Blacktail Creeks. The United States claims all waste, seepage, spring, and percolating water arising within the project, and proposes to use such water in connection therewith.

The irrigable lands of the project are located, in general, in the southeastern portion of the Blackfeet Indian Reservation adjacent to the north bank of Cutbank Creek and between Cutbank Creek and Birch Creek. Of the above irrigation plan the first development of the Two Medicine Canal system has been completed, including 36 miles of main canal, with headworks and other structures and distribution system complete with structures to deliver water to approximately 24,000 acres of land. A storage reservoir has been constructed at lower Two Medicine Lake to furnish a maximum storage of 16,000 acre-feet of water for this unit. On the Badger-Fisher unit a small canal and lateral system has been constructed, with the exception of small laterals and structures to reach unallotted land, diverting water from Badger Creek direct to approximately 3,000 acres of the Piegan Flats. A supply canal, 12 miles long, diverting water to Four Horns Reservoir, has been completed to its first development. Temporary controlling works to Four Horns Lake have been completed, making available a reservoir of 4,000 acre-feet capacity. Water from this storage follows a natural channel to Blacktail Creek, from which it is diverted into the Fisher Canal, designed to irrigate about 30,000 acres of Fisher Flats. The Fisher Canal has been completed to its first development, both as to excavation and structures, to the end at mile 30. Excavation of a lateral system has been completed to cover approximately 18,000 acres of allotted land on the Fisher Flats. The larger structures on the lateral system have been completed and the smaller ones will be built as needed. The Birch Creek Canal and main lateral have been completed as to excavation to irrigate 2,600 acres of land. The larger structures on this system have been completed and the smaller structures will be built as needed.

Work for the immediate future includes the building of minor structures on the Fisher distribution system to complete the works to irrigate 18,000 acres, the building of minor structures on the Two Medicine and Birch systems as needed to reach allotted lands, and the enlargement of a portion of Two Medicine Canal.

SUMMARY OF GENERAL DATA FOR BLACKFEET (INDIAN) PROJECT, TO END OF FISCAL YEAR, 1918.

Areas:		
Irrigable acreage when project is complete		122, 500
Public land entered to end of fiscal year	11, 000	
Public land withdrawn at end of fiscal year	50, 020	
Indian land	61, 480	
Acreage service could have supplied season of 1917		[1] 48, 240
Estimated acreage service can supply July 1, 1919		48, 240
Acreage actually irrigated, season of 1917		2, 448
Acreage cropped under irrigation, season of 1917		2, 298
Crops:		
Value of irrigated crops, season of 1917		$31, 748. 00
Value of irrigated crops per acre cropped		13. 81

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[1] The 48,240 acres given as the area for which the service can now supply water is the area covered by distribution systems which are either complete or complete except minor structures and extensions. The main canals are not constructed to a capacity to deliver water to this area, but will supply water to only about 25,600 acres, provided that much were actually irrigated.

Finances:

Net construction cost to end of fiscal year		$1,009,660.80
Per cent complete at end of fiscal year		29
Appropriated for fiscal year 1919, total		$50,000.00
Allotment for construction, fiscal year 1919		$65,000.00
Estimated per cent complete June 30, 1919		31
Proposed appropriation, fiscal year 1920, for construction		$110,000.00
Estimated gross construction cost to June 30, 1920		$1,187,000.00
Estimated per cent complete June 30, 1920		34
Appropriation, fiscal year 1918		$25,000.00
Balance from previous appropriations included with 1918 allotment		7,437.65
		32,437.65
Expenditures during fiscal year, chargeable to 1918 appropriation:		
Disbursements	$17,223.73	
Registered liabilities chargeable to 1918 appropriation	5,734.63	
		22,958.36
Unencumbered balance July 1, 1918		9,479.29

CONSTRUCTION DURING FISCAL YEAR.

Two Medicine unit.—Two log cribs were constructed and filled with rock to divert Two Medicine River away from the canal. An extension was built to the concrete culvert where the Two Medicine Canal crosses the Great Northern Railroad, made necessary on account of double tracking, and minor structures were placed on the Two Medicine distribution system as necessary to deliver water to allotted land.

Birch Creek unit.—Minor structures were placed as necessary to deliver water to allotted land.

OPERATION AND MAINTENANCE.

The Two Medicine, Badger-Fisher, and Birch Creek systems were operated during the season of 1917. Water was delivered to a total of 91 farm units, representing 4,211 acres. A total of 2,448 acres were irrigated, of which 2,298 acres were actually cropped. The first part of the season was cold and backward, so that scarcely any irrigation was done before July 1. Two thousand six hundred and sixty-three acre-feet of water were delivered, or 1.08 acre-feet per acre irrigated. The same systems are being operated during the 1918 season, with about 3,500 acres under cultivation.

Historical review, Blackfeet project.

Item.	1913	1914	1915	1916	1917	1918
Acreage for which the service was prepared to furnish water	26,640	26,640	26,640	46,640	48,240	48,240
Acreage irrigated	....	675	1,618	2,102	2,448	....
Miles of canal operated	....	44	65	109	125	[1] 135
Water diverted (acre-feet)	700	15,380	8,254	7,036	21,284	....
Water delivered to land (acre-feet)	....	4,430	2,970	1,735	2,663	....
Per acre of land irrigated (acre-feet)	....	....	1.83	.83	1.08	....

[1] Estimated.

SETTLEMENT.

Land under the project has not yet been opened for settlement. About 55,000 acres have been allotted to Indians, but, except in a few cases, have not been settled upon by them or farmed.

Settlement data, Blackfeet project.

Item.	1912	1913	1914	1915	1916	1917	1918
Total number of farms on project	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Population	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Number of irrigated farms			12	18	79	91	[2] 100
Operated by owners or managers			12	16	79	84	[2] 85
Operated by tenants				2		7	[2] 15
Population			40	50	170	180	200
Number of towns	4	4	4	4	4	4	4
Population	300	300	300	375	1,750	1,900	2,000
Total population in towns and on farms	300	300	340	425	1,920	2,070	2,200
Number of schools	1	1	1	1	5	3	3
Number of churches	2	2	2	3	8	8	8
Number of banks					3	4	4

(1) Not opened.

[2] Estimated.

PRINCIPAL CROPS.

Wheat, flax, native and timothy hay, alfalfa, oats, potatoes, and small vegetables do well when properly irrigated and cultivated. The results in 1917 were only fair, as the season was cold and backward the early part of the summer and later in the summer hot with high winds. In 1918 irrigation was started approximately one month earlier than in 1917, with a promise of considerably better results on a larger area.

Blackfeet (Indian) project, Montana, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	56	Tons	56	1	$15.00	$940	$15.00
Barley	9	Bushels	99	11	.98	97	10.78
Flax	609	...do	2,740	4.5	2.90	7,946	13.05
Garden	11	Acre		128	128.00	1,408	128.00
Hay, grain	236	Ton	153	.65	10.00	1,530	6.50
Hay, native	913	...do	913	1	10.00	9,130	10.00
Oats	21	Bushel	336	16	.75	252	12.00
Potatoes	20	...do	1,280	64	1.00	1,280	64.00
Timothy	67	Ton	67	1	15.00	1,005	15.00
Wheat	356	Bushel	4,272	12	1.91	8,160	22.92
Total cropped	2,298	Total and average				31,748	13.81
		Areas.			Acres.	Farms.	Per cent of project.
Fall plowing	150	Total irrigable area farms reported			4,211	91	8.7
		Total irrigated area farms reported			2,448	91	5.0
		Under water-right applications			2,198	84	4.5
		Under rental contracts			250	7	.5
Grand total irrigated	2,448	Total cropped area farms reported			2,298	86	4.8

FINANCIAL STATEMENT.

Project balance sheet, Blackfeet project, June 30, 1918.

Cash		$4.60
Inventory of stock on hand		5,782.67
Accounts receivable		228.37
Construction cost	$1,012,644.74	
Less construction revenue earnings	2,983.94	
		1,009,660.80
Total		1,015,676.44
Accounts payable		7,595.29
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	$1,016,504.61	
Collection, transfer, refund, and joint construction vouchers issued	8,423.46	
Net investment		1,008,081.15
Total		1,015,676.44

Feature costs of Blackfeet (Indian) project to June 30, 1918.

Features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys	$1,142.97	$7,613.67
Storage system:		
Two Medicine unit	[1] 3,807.34	138,258.10
Spring Lake Reservoir, survey and design	[1] 52.05	1,890.63
Badger Creek Reservoir, survey and design	[1] 8.30	302.62
Four Horns Reservoir, survey and design	[1] 36.02	1,308.62
Four Horns Reservoir Dam	[1] 307.45	11,165.00
Guardipee Reservoir	597.00	597.00
Total, storage system	[1] 3,614.16	153,521.97
Canal system:		
Cutbank unit, surveys and designs	[1] 27.01	981.73
Birch Creek unit, surveys and designs	[1] 44.54	1,617.86
Carlow unit, surveys and designs	[1] 16.70	606.76
Two Medicine Canal	[1] 8,061.35	292,719.55
Two Medicine headworks	[1] 16,263.98	16,683.55
Four Horns supply canal	[1] 2,850.56	100,033.12
Four Horns supply canal headworks	[1] 238.06	8,645.43
Fisher main canal	[1] 3,950.08	143,441.06
Blacktail diversion	[1] 410.95	14,923.50
Piegan Canal headworks	[1] 45.08	1,636.96
Siphon, White Tail Creek crossing	[1] 372.01	13,509.76
Birch Creek Canal headworks	[1] 59.25	2,152.13
Birch Creek main canal	[1] 234.55	8,518.05
Culvert under Great Northern Ry., Seville, Mont	1,420.45	1,420.45
Two Medicine unit, main canal construction	842.25	842.25
Total, canal system	[1] 30,311.42	607,732.16
Lateral system:		
Two Medicine lateral system	15,056.61	27,160.52
Piegan lateral system	[1] 450.59	16,362.52
Fisher Canal lateral system	[1] 2,304.45	83,682.44
Birch Creek lateral system, surveys and designs	[1] 26.16	950.35
Birch Creek lateral system	658.30	7,133.02
Badger-Fisher laterals	37.29	532.05
Fisher Canal drop, north lateral, station O	[1] 144.88	5,261.14
Two Medicine unit, lateral system	2,063.63	2,063.63
Total, lateral system	14,889.75	143,145.67
Permanent improvements:		
Buildings, all units		11,603.98
Roads, Fisher Canal distribution system		2,836.38
Two Medicine division	18,187.23	25,691.65
Roads, Piegan distribution system		202.10
Roads, Browning to Robare	29.48	67.43
Wells, Two Medicine division		1,552.21
Camp site near Family	60.00	60.00
Bridge across Badger Creek	1,073.33	1,073.33
Total, permanent improvements	19,350.04	43,087.08

[1] Deduct.

Feature costs of Blackfeet (Indian) project to June 30, 1918—Continued.

Features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Telephone system	[1] $222.39	$8,075.81
Operation and maintenance during construction	10,582.62	44,674.04
Plant account	[1] 1,170.56	5,181.38
Undistributed clearing account	[1] 393.48	[1] 387.04
Gross construction cost to June 30, 1918	10,253.37	1,012,644.74
Less revenues earned during construction period:		
Rentals of buildings	65.10	956.35
Rentals of irrigation water	516.00	516.00
Rentals of telephones and tolls	19.40	759.05
Contractor's freight refunds	....	36.04
Other revenues, unclassified	....	7.50
Profit on hospital operations	41.40	703.68
Other profits on operations, unclassified	5.32	5.32
	647.22	1,002,983.94
Net cost of construction of project to June 30, 1918	....	1,009,660.80

[1] Deduct.

Statement of cost by calendar years, Blackfeet project.

Year ending Dec. 31—	Construction.	Operation and maintenance during construction.	Total cost.
1907	$1,769.20	....	$1,769.20
1908	59,192.31	....	59,192.31
1909	109,900.55	....	109,900.55
1910	152,674.36	....	152,674.36
1911	173,373.96	$8,372.50	181,746.46
1912	189,797.18	4,696.85	194,494.03
1913	152,716.96	1,154.75	153,871.71
1914	75,224.26	4,334.33	79,558.59
1915	35,548.24	2,026.60	37,574.84
1916	11,489.05	4,836.78	16,325.83
1917	*22,491.46	12,395.63	*10,095.83
January to June 30, 1918	23,981.75	6,856.60	30,838.35
Plant account	4,794.34	....	4,794.34
Total	967,970.70	44,674.04	1,012,644.74

Statement of cost by fiscal years, Blackfeet project.

Year ending June 30—	Construction.	Operation and maintenance during construction.	Total cost.
1908	$9,047.80	....	$9,047.80
1909	86,251.96	....	86,251.96
1910	146,464.17	....	146,464.17
1911	140,737.83	....	140,737.83
1912	213,957.37	$1,731.57	215,688.94
1913	166,663.04	11,977.10	178,640.14
1914	132,594.42	4,088.12	136,682.54
1915	36,674.44	1,784.35	38,458.79
1916	24,066.27	4,108.95	28,175.22
1917	5,484.27	10,401.33	15,885.60
1918	1,234.79	10,582.62	11,817.41
Undistributed plant and clearing account	4,794.34	....	4,794.34
Total	967,970.70	44,674.04	1,012,644.74

Estimated cost of contemplated work, Blackfeet project, during fiscal year 1919.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys:		
Stream gauging	$1,000	
Miscellaneous surveys	200	
		$1,200
Canal system: Two Medicine Canal		27,500
Lateral system: Principal minor structures on Fisher distribution system and lateral extensions as needed on Two Medicine, Piegan and Birch Creek systems		16,000
Permanent improvements and lands: 3 permanent cottages at headquarters camp and 1 small operation and maintenance camp		7,500
Telephone system: For extensions between operation and maintenance camps		800
Operation and maintenance during construction (water-rental basis):		
Operation	3,500	
Maintenance	8,500	
		12,000
Total		65,000

MONTANA, FLATHEAD (INDIAN) PROJECT.

F. T. CROWE, project manager, St. Ignatius, Mont.

LOCATION.

Counties: Flathead, Missoula, Sanders.

Townships: 15 to 25 N., Rs. 17 to 25 W., Montana meridian.

Railroad: Northern Pacific.

Towns and estimated population, June 30, 1918: Evaro, 100; Arlee, 150; Ravalli, 100; Dixon, 200; Perma, 75; Camas, 100; Dayton, 60; Big Arm, 60; Polson, 1,800; St. Ignatius, 500; Ronan, 700; Hot Springs, 350; Charlo, 75; and Pablo, 150.

WATER SUPPLY.

Source of water supply: Jocko and Little Bitter Root Rivers; Mud, Crow, Post, Mission, Dry, Finley, Agency, Big Knife, Valley, and Falls Creeks; and about 60 smaller streams.

Area of drainage basin: 225 square miles.

Annual run-off in acre-feet of creeks, 1909 to 1917. Maximum, 473,500; minimum, 231,100; mean, 286,700.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which the service is prepared to supply water, season of 1918: 84,300 acres.

Area under water-rental applications, season 1918 (to June 30): 40,000 acres.

Length of irrigating season: May 1 to September 30, 153 days.

Average elevation of irrigable area: 3,000 feet above sea level.

Rainfall on irrigable area: At St. Ignatius (Mont.) station, 1909 to 1917, average, 17.94 inches; 1917, 14.32 inches.

Range of temperature on irrigable area: −30° to 96° F.

Character of soil of irrigable area: Varies from light sandy loam to heavy clay.

Principal products: Grain, hay, vegetables, fruit, and cattle.

Principal markets: Missoula, Butte, and Anaconda, Mont., and other mining and lumber towns and camps.

LANDS OPENED FOR IRRIGATION.

Dates of public notices and orders: Proclamation of the President May 22, 1909, opened lands to filing under certain rules as to registration, etc., first filing to be May 2, 1910.

Location of lands opened: Tps. 17 to 24 N., Rs. 19 to 24 W., Montana meridian.

Limit of area of farm units: 160 acres; average irrigable, about 40 acres.

Duty of water: Works will provide about 1.3 acre-feet per acre per annum at the farm.

Building charges: Not fixed.

Annual operation and maintenance charges: Rental basis, 50 cents per acre-foot.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys begun in 1907.

Construction authorized and first appropriation made by act of Congress approved April 30, 1908.

Construction begun, Jocko, Mission, and Polson divisions, 1909.

Land opened to homestead entry, May, 1910.

Irrigation in Jocko and Mission divisions begun in 1910.

Irrigation in Post division begun in 1911.

Kickinghorse feeder canal completed in 1912.

Irrigation in Polson and Pablo divisions begun in 1913.

Entire project 46.1 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan of the Flathead project provides for the irrigation of about 134,500 acres of land in various parts of what was the Flathead Indian Reservation, water being diverted from creeks and rivers rising in the Mission Mountains or in the Little Bitter Root drainage area and conducted by canals directly to the land and to reservoirs for the storage of flood waters. About eight reservoirs will be constructed. Some of these are lakes, the capacity of which will increase, and others natural basins, which will require only the building of embankments at low points. Irrigable tracts on the Jocko, Mission, Post, Pablo, and Polson divisions, which contain the largest percentage of irrigable land allotted to the Indians, have been selected for the first development. The United States claims all waste, seepage, unappropriated spring, and percolating water arising within the project and proposes to use such water in connection therewith.

The following principal features have been completed: Two distributing systems covering approximately 13,500 acres in Jocko Valley, taking water from Jocko River and tributaries; a distribution system covering about 10,600 acres and taking water from Mission Creek; a distribution system lying below Kickinghorse Dam site, covering about 2,000 acres; a distribution system lying under the Ninepipe Reservoir, covering about 21,500 acres, which, together with the previous-mentioned tract, takes water from Post Creek and tributaries; a distribution system taking water from Crow Creek for about 3,800 acres in Moiese Valley; a distribution system under Pablo Reservoir, taking water from Post, Crow, and Mud Creeks for about 31,700 acres; and a distribution system taking water from the last-named creeks for about 1,200 acres near Polson. Five storage reservoirs have been constructed: Pablo Reservoir for 7,000 acre-feet; Ninepipe for 5,000 acre-feet; Tabor for 12,500 acre-feet; McDonald for 2,000 acre-feet; and Little Bitter Root Lake for 9,000 acre-feet. The Pablo Feeder Canal has been built from 2 miles south of Post Creek to Pablo Reservoir, a distance of about 29 miles, picking up the waters of all streams flowing from the mountains. The section of the Pablo Feeder between Dry and Mission Creeks has been built, a distance of about 3 miles.

SUMMARY OF GENERAL DATA FOR FLATHEAD (INDIAN) PROJECT TO END OF FISCAL YEAR 1918.

Areas:		
Irrigable acreage when project is complete		[1] 134,500
Public land entered to end of fiscal year	35,780	
Public land withdrawn at end of fiscal year	6,720	
State land	9,635	
Indian land	81,375	
Private land	990	
Acreage service could have supplied season of 1917		[2] 80,300
Addition in fiscal year 1918		4,000
Estimated addition in fiscal year 1919		13,300
Estimated acreage service can supply July 1, 1919		97,600
Acreage actually irrigated, season of 1917		15,863
Acreage cropped under irrigation, season of 1917		15,423
Crops:		
Value of irrigated crops, season of 1917		$280,793.00
Value of irrigated crops, per acre cropped		$18.21
Finances:		
Net construction cost to end of fiscal year		$3,304,465.01
Per cent complete at end of fiscal year		46.1
Appropriated for fiscal year 1919, total		$375,000.00
Allotment for construction, fiscal year 1919		$337,000.00
Estimated per cent complete, June 30, 1919		52
Proposed appropriation, fiscal year 1920 for construction		$750,000.00
Estimated gross-construction cost to June 30, 1920		$4,456,000.00
Estimated per cent complete, June 30, 1920		68

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[1] Plans are in process to make a reduction of irrigable acreage on project to 99,000 acres. Board report has been approved by the director, but has not been approved by the Indian Office.

[2] Ditches completed to the lands but insufficient storage should all units demand water at once.

Finances—Continued.		
Appropriation, fiscal year 1918, available May 28, 1917		$750,000.00
Encumbered prior to July 1, 1917		77,498.29
Balance available for fiscal year 1918		672,501.71
Expenditures during fiscal year, chargeable to 1918 appropriation:		
Disbursements	$631,648.43	
Registered liabilities chargeable to 1918 appropriation	78,753.16	
		710,401.59
To be charged to appropriation for 1919, made available May 29, 1918		37,899.88
Repayments—Water-rental charges:		
Accrued to end of fiscal year		48,424.48
Collected to end of fiscal year		31,574.42
Uncollected to end of fiscal year		16,850.06
Drainage:		
Estimated acreage damaged by seepage to end of fiscal year		440
Miles of drain built to end of fiscal year:		
Open	0.18	
Closed	2.97	
Total	3.15	
Estimated acreage protected by drains built to end of fiscal year		1,240
Estimated acreage to be protected by authorized system		1,240
Cost of drainage works to end of fiscal year		51,574.01

CONSTRUCTION DURING FISCAL YEAR.

Mission division.—Government forces at Tabor Reservoir completed the lining of the lined section, concreted the tunnel, concreted the gate tower and installed gates and built the trash rack at the upper portal. Tabor reservoir is now available for the storage of 12,500 acre-feet of water. The excavation and structures on lateral C were completed. Steam-shovel excavation of the Pablo feeder canal was completed between Dry and Mission Creeks.

Post division.—The conduit and gate tower at Lake McDonald were completed for the first development and the butterfly and one cylinder gate installed; 2,000 acre-feet of storage are now available here. Lateral F has been completed as well as the concrete pipe siphon and practically all the structures and excavation on the laterals A and C extension. The concrete lining and structures and practically all of the earthwork, except the 44MA and 46MA siphons, have been completed on the MA extension.

Pablo division.—Contract work on laterals 43A and 50A was completed. Government forces completed the riprapping on South Pablo Dam, increasing the storage from 5,000 to 7,000 acre-feet.

Camas division.—Government forces completed the diversion dam, lined the tunnel, completed the flumes and lined section, and finished the earthwork on Camas A canal. Government forces took over and completed the excavation of Camas laterals after the suspension of the contract. Government forces completed minor structures for about 60 per cent of the lateral system and started work at Hubbart Dam, but were forced to suspend operations because of lack of appropriation of money.

SEEPAGE AND DRAINAGE.

Polson drainage conditions remain about the same. The surface is dry but water still stands in some of the cellars. Seeped areas have appeared southwest of Polson proper, about three-quarters of a mile west of the Grandview district, where the seepage has been most marked heretofore.

BOARD MEETINGS.

Date.	Topic.	Personnel.
Nov. 10-13, 1917	Consideration of storage requirements of Camas division.	D. C. Henny, A. J. Wiley, Chas. P. Williams, F. T. Crowe.
Mar. 5-11, 1918	General report on Flathead project	D. C. Henny, Chas. P. Williams, and F. T. Crowe.
Mar. 25, 1918	Outlining work for irrigation season of 1918.	Project employees.
Apr. 1-6, 1918	Construction program, fiscal year 1919	W. M. Reed, Chas. P. Williams, and F. T. Crowe.

OPERATION AND MAINTENANCE.

The calendar year of 1917, and especially the irrigation season, were exceptionally dry, 0.13 inch being the total precipitation at St. Ignatius between June 21 and September 10. The farmers refused to irrigate early, hoping for a big rain about the 1st of July. When the rain did not come a great rush was made for water. The service was unable to supply all on demand which, coupled with the fact that the farmers were poorly prepared to use water, made the irrigation of slight benefit. Grasshoppers appeared early during the summer and seriously damaged the growing crops. The number of farms reported irrigated was 567, comprising 15,863 acres; 21,691 acre-feet of water were delivered to farmers, giving an average duty of about 1.37 acre-feet. The acreage irrigated was nearly three times that in 1916, but this does not indicate a proportionate increase in the acreage cropped, as many crops had heretofore been raised without irrigation.

Historical review, Flathead project.

Item.	1911	1912	1913	1914	1915	1916	1917	1918[1]
Area for which service was prepared to supply water (storage incomplete)	19,000	35,000	42,400	48,900	52,400	66,000	80,300	84,300
Acreage irrigated	2,369	4,203	4,631	6,416	3,242	4,373	15,863	21,000
Miles of canal operated	46	103	180	233	201	232	364	[2] 300
Water diverted (acre-feet)	10,940	21,875	22,945	46,329	21,029	23,942	54,853	[2] 60,000
Water delivered to the land (acre-feet)	4,719	8,344	6,104	8,752	3,637	5,751	21,691	20,200
Per acre of land irrigated (acre-feet)	1.99	1.98	1.30	1.36	1.12	1.32	1.37	0.96

[1] To June 30, 1918.

[2] Estimated.

SETTLEMENT.

A considerable number of new settlers have come to the project during the past year, being purchasers of Indian allotments and State lands which have been sold. Approximately 100 Indian allotments have been sold, bringing an average price of $25 per acre. The Northern Pacific Railway completed their Flathead Valley branch line. Two new town sites were settled, Charlo and Pablo, sales of town lots being held in the fall of 1917.

Settlement data, Flathead project.

Item.	1913	1914	1915	1916	1917	1918[1]
Total number of farms on project irrigable[2]	2,980	2,980	2,980	2,980	2,630	2,630
Population	8,400	13,855	14,000	14,000	14,500	[3] 14,500
Number of irrigated farms	155	223	185	303	567	650
Operated by owners or managers	127	188	159	219	425	500
Operated by tenants	28	35	26	84	142	150
Population	(4)	578	433	627	1,319	1,500
Number of towns	10	10	11	12	12	14
Population	(4)	2,842	3,147	3,460	4,000	4,825
Total population in towns and farms	(4)	16,697	17,147	17,460	18,500	18,825
Number of public schools	....	36	48	51	55	60
Number of churches	....	14	14	15	15	15
Number of banks	....	9	9	9	9	11
Total capital stock	....	$205,000	$205,000	$205,000	$205,000	$221,000
Amount of deposits	....	$535,870	$495,000	$745,733	$1,283,988	$1,011,177
Number of depositors	....	2,614	2,603	3,669	4,608	4,384

[1] June 30, 1918.
[2] Includes both dry and irrigated farms.
[3] Estimated.
[4] Included in second item.

PRINCIPAL CROPS.

Crop conditions for the season of 1917 were very disappointing. The hay crop was nearly normal and brought good prices, the grain yield was about half the normal yield due to a late spring, lack of natural moisture, and disinclination to use water. Grasshoppers did some damage along the Flathead River. The crop value per acre exceeds that of 1916 by $2.50, or 16 per cent. This should be compared with the entire State of Montana where the unfavorable season caused a decrease of 45 per cent in crop value as compared with that of 1916. Horses have increased both in number and value, but other live stock, especially hogs, have decreased in number.

Crop report, Flathead (Indian) project, Montana, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa hay	1,104	Ton	1,520	1.38	$20.00	$30,400	$27.55
Alfalfa seed	5	Bushel	10	2.00	15.00	150	30.00
Apples	8½	Pound	3,900	458.00	250.00	117	13.74
Barley	65	Bushel	361	5.60	1.50	541	8.40
Beans	3	...do	17	5.67	9.00	153	51.00
Beets, sugar	391	Ton	1,834	4.70	8.00	14,672	37.53
Clover hay	286	...do	379	1.33	20.00	7,580	26.50
Corn	½	Bushel	35	70.00	.90	31	63.00
Corn fodder	20	Ton	103	5.15	15.00	1,545	77.25
Flax	10	Bushel	....	.00	.00	0	.00
Garden	165	Acre	....	....	....	6,830	41.40
Hay	3,196	Ton	3,318	1.04	20.00	66,360	20.80
Oats	1,863	Bushel	30,236	16.25	.90	27,212	14.60
Onions	14	...do	2,073	148.00	1.50	3,110	222.10
Pasture	1,867	Acre	....	....	....	6,339	3.40
Peas	8	Bushel	88	11.00	5.00	440	55.00
Potatoes	163	...do	11,586	70.46	1.25	14,482	38.85
Wheat	7,589	...do	53,071	7.00	1.90	100,835	13.30
Total	16,758	....	....	....	....	....	....
Less duplicated areas	1,335	....	....	....	....	....	....
Total cropped	15,423	Total and average				280,793	18.21

Irrigated, no crop:	
Young alfalfa	204
Young clover	62
Non-bearing orchard	52
Miscellaneous	162
Less duplicated areas	40
Total irrigated	15,863

Areas.	Acres.	Farms.	Per cent of project.
Total irrigable area farms reported	38,000	567	28
Total irrigated area farms reported	15,863	567	12
Under rental contracts	15,863	567	12
Total cropped area farms reported	15,423	567	12

FINANCIAL STATEMENT.

Project balance sheet, Flathead project, June 30, 1918.

Cash		$1,573.66
Inventory of stock on hand		124,219.22
Accounts receivable		17,011.36
Construction cost	$3,374,515.52	
Less construction, revenue earnings	70,050.51	
		3,304,465.01
Total		3,447,269.25
Accounts payable		77,573.22
Contingent obligations		1,179.94
Reserves for repayment of advances from reclamation fund		1,534,302.50
Capital investment:		
Disbursement, transfer, and joint-construction vouchers received	$3,527,438.47	
Collection, transfer, refund, and joint-construction vouchers issued	1,693,224.88	
Net investment		1,834,213.59
Total		3,447,269.25

Feature costs of Flathead project, Montana, to June 30, 1918.

Principal features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examination and surveys	$7,381.36	$54,042.24
Storage system:		
Mission division—		
Surveys		15,652.24
Tabor Reservoir tunnel and controlling works	69,454.62	151,747.79
Post division—		
Surveys		11,150.15
Ninepipe Reservoir Dam and controlling works		51,787.21
Ninepipe feed canal		3,757.71
Kickinghorse feed canal		55,083.01
McDonald Lake Reservoir—		
Controlling works	14,066.26	29,395.74
Outlet canal	17,720.76	25,661.41
Crow division: Crow Reservoir (surveys only)		1,030.00
Pablo division—		
Surveys		26,890.09
North Pablo Dam and controlling works		73,235.47
Middle Pablo Dam		4,619.96
South Pablo Dam and controlling works	15,263.91	135,031.83
Horte Dam and controlling works		5,507.52
Polson division: Surveys		490.15
Camas division—		
Surveys	5,557.08	11,340.84
Little Bitter Root Dam and controlling works		15,611.86
Hubbart Dam and controlling works	16,778.70	17,011.68
Total storage system	138,841.33	635,004.66
Canal system:		
Mission division—		
Surveys	420.28	420.28
Pablo feed canal	25,142.79	25,142.79
Pablo division—		
Surveys	516.04	26,808.67
Pablo feed canal, exc		180,101.65
Drops (4)		14,375.89
Diversion works (4)		31,420.13
Wasteways (2)		2,660.00
Camas division—		
Surveys		3,011.12
Camas A diversion dam and headworks	1,099.15	8,559.37
Camas A tunnel	9,893.30	49,929.13
Camas A Canal	82,242.43	104,739.83
Camas A Canal, flume station 58 to 107	15,917.40	44,934.26
Camas A Canal, lined section	16,637.14	30,872.56
Total canal system	151,868.53	522,975.68
Lateral system:		
Jocko division	1,534.70	158,547.85
Mission division	46,195.88	134,228.26
Post division	102,978.97	287,022.52
Moiese division	78,397.95	293,549.21
Crow division		5,500.00
Pablo division	27,303.34	395,153.66

Feature costs of Flathead project, Montana, to June 30, 1918—Continued.

Principal features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Lateral system—Continued.		
Valley View division	$1,428.64	$150,903.83
Polson division	304.38	15,750.50
Camas division	145,005.17	168,482.74
Total lateral system	403,149.03	1,609,138.57
Drainage system: Polson division, Polson drain	1,385.88	51,574.01
Power system: Polson division, Newell tunnel		101,685.11
Farm units: Project as a whole	7,765.18	23,111.49
Permanent improvements and lands:		
Headquarters office and camp buildings		4,040.00
Mission division—		
Tabor Reservoir, camp buildings		2,530.12
Tabor Reservoir, road	70.04	7,658.41
Post division, Ninepipe camp buildings	1,500.26	6,974.61
Moiese division—		
River camp buildings		332.46
Moiese camp buildings		1,526.37
Pablo division: Horte camp buildings and grounds	1,372.62	1,380.12
Camas division: Lonepine camp buildings and grounds	9.22	6,855.01
Jocko division: Jocko camp buildings and grounds	440.58	440.58
Total permanent improvements and lands	3,392.72	31,737.68
Telephone system: Project as a whole	165.12	17,016.89
Operation and maintenance during construction	72,679.31	200,529.93
Subtotal	786,628.46	3,246,816.26
Plant accounts	15,348.93	122,292.74
Unadjusted clearing accounts	10,986.72	5,406.52
Gross cost to June 30, 1918	812,964.11	3,374,515.52
Less revenues earned during construction period:		
Rental of buildings	1,050.52	7,605.73
Rental of grazing and farm lands	407.00	1,649.75
Rental of irrigating water	12,567.74	48,424.48
Rental of telephone and tolls		5,637.28
Contractors' freight refunds	179.14	2,784.04
Forfeitures by defaulting bidders		1,830.00
Revenues, miscellaneous		803.45
Hospital gain	[1] 1,439.82	1,315.78
Mess-house gain	[1] [2] 815.34	
Mercantile-store gain	[1] [2] 9,290.73	
Total revenues	2,658.51	70,050.51
Net cost	810,305.60	3,304,465.01

[1] Deduct. [2] Transferred to feature costs.

Statement of costs, by calendar years, Flathead project.

Year ending Dec. 31—	Construction.	Operation and maintenance during construction.	Total cost.
1908	$25,303.90		$25,303.90
1909	149,160.88		149,160.88
1910	242,779.63		242,779.63
1911	416,550.60	$4,719.97	421,270.57
1912	211,971.63	8,614.63	220,586.26
1913	166,360.35	18,789.00	185,149.35
1914	186,724.49	24,423.08	211,147.57
1915	156,159.17	29,061.80	185,220.97
1916	379,881.65	28,774.13	408,655.78
1917	870,509.53	51,083.80	921,593.33
June 30, 1918 (6 months)	240,884.50	35,063.52	275,948.02
Subtotal	3,046,286.33	200,529.93	3,246,816.26
Unadjusted clearing accounts	5,406.52		5,406.52
Plant accounts	122,292.74		122,292.74
Total	3,173,985.59	200,529.93	3,374,515.52

Statement of costs, by fiscal years, Flathead project.

Year ending June 30—	Construction.	Operation and maintenance during construction.	Total cost.
1908	$3,347.89		$3,347.89
1909	66,571.91		66,571.91
1910	185,377.41		185,377.41
1911	341,840.64		341,840.64
1912	341,334.95	$8,148.67	349,483.62
1913	162,105.21	14,075.25	176,180.46
1914	243,227.82	19,849.42	263,077.24
1915	104,257.28	28,860.76	133,118.04
1916	228,229.35	27,354.10	255,583.45
1917	656,044.72	29,562.42	685,607.14
1918	713,949.15	72,679.31	786,628.46
Subtotal	3,046,286.33	200,529.93	3,246,816.26
Unadjusted clearing accounts	5,406.52		5,406.52
Plant accounts	122,292.74		122,292.74
Total	3,173,985.59	200,529.93	3,374,515.52

Estimated cost of contemplated work, Flathead project, during fiscal year 1918.

Principal features.	Estimated cost during fiscal year 1919.	
	Subfeature.	Principal feature.
Examination and surveys		$5,000
Storage:		134,000
Little Bitter Root Reservoir	$14,000	
Pablo Reservoir	120,000	
Canal system, Pablo feeder:		72,000
Betterments	34,000	
New construction	38,000	
Lateral systems:		66,000
Jocko division	2,000	
Mission division	3,500	
Post division	23,000	
Moiese division	23,500	
Pablo division	2,000	
Camas division	12,000	
Drainage system		5,000
Irrigable lands		7,000
Permanent improvements		5,000
Telephone system		1,000
Operation and maintenance during construction		50,000
Stores and other operations		5,000
Plant and equipment		25,000
Total		375,000

MONTANA, FORT PECK (INDIAN) PROJECT.

R. M. CONNER, project manager, Poplar, Mont.

LOCATION.

Counties: Valley, Sheridan.

Townships: 26 to 33 N., Rs. 39 to 56 E., Montana meridian.

Railroad: Great Northern.

Railroad stations and estimated population June 30, 1918: Wiota;[1] Kintyre;[1] Oswego, 350; Lohmiller;[1] Wolf Point, 1,500; Chelsea;[1] Poplar, 1,400; Sprole;[1] Brockton, 250; Calais;[1] and Blair.[1]

WATER SUPPLY.

Source of water supply: Missouri and Poplar Rivers; Little Porcupine, Big Porcupine, Wolf, Smoke, and Big Muddy Creeks.

Area of drainage basins: Missouri River, 85,000 square miles; Poplar River, 3,000 square miles; Big Porcupine Creek, 683 square miles.

Annual run-off in acre-feet (1909–1917): Poplar River, mean, 87,200; Big Porcupine Creek, mean 20,300; Little Porcupine Creek, mean 5,800; Big Muddy Creek, mean, 39,400.

AGRICULTURAL AND CLIMATIC CONDITIONS.

Area for which service is prepared to supply water, season of 1918: Little Porcupine unit, 2,330 acres; Poplar River unit, 10,290 acres. Big porcupine unit, 4,000 acres.

Area irrigated, season of 1918: 1,000 acres to June 30, 1918.

Length of irrigating season: From From April 1 to August 31, 153 days.

Average elevation of irrigable area: 2,000 feet above sea level.

Rainfall on irrigable area: 1886 to 1917, average, 13.51 inches; 1917, 6.42 inches.

Range of temperature on irrigable area: −40° to 100° F.

Character of soil of irrigable area: Heavy clay and loam.

Principal products: Hay, grain, and vegetables.

Principal markets: Local and Minneapolis and St. Paul.

LAND OPEN FOR IRRIGATION.

In the construction of the systems laterals are being constructed to the allotted areas only. The work of allotting has been completed, but a few changes are being made. The allotted area in each unit is as follows: Big Porcupine, 6,400 acres; Little Porcupine, 2,330 acres; Missouri River, 38,000 acres; Poplar River, 11,600 acres; Big Muddy, 12,900 acres. Under the Poplar River unit 400 acres of land under the canals have been sold to whites.

CHRONOLOGICAL SUMMARY.

Reconnoissance and preliminary surveys made in 1908.

Little Porcupine unit completed to allotted irrigable area in July, 1911.

Poplar River unit completed to allotted irrigable area of 7,890 acres in 1916.

Big Porcupine unit completed to 4,000 acres of allotted land, June, 1917.

Entire project 11.5 per cent completed June 30, 1918.

IRRIGATION PLAN.

The irrigation plan for the Fort Peck project provides, in so far as the water supply is found sufficient, for the irrigation of lands in various parts of the Fort Peck Indian Reservation and adjacent territory as follows: (1) 4,000 acres in the vicinity of Wiota station, with flood waters from Big Porcupine Creek; (2) 2,000 acres in the vicinity of Frazer, with water supply from Little Porcupine Creek conserved by storage; (3) 28,000 acres in the vicinity of Poplar and extending along Poplar River a distance of 35 miles, with water supply from Poplar River conserved by storage below the forks of Poplar and West Branch; (4) 16,000 acres lying along the west side of Big Muddy Creek, with water supply from Big Muddy Creek conserved by storage on Smoke and Wolf Creeks; (5) 50,000 acres of clear bench land and approximately 34,000 acres of brush and timber land extending along the Missouri River, with water supply from the Missouri River by a gravity canal heading near the site of old Fort Peck; (6) 10,000 acres, known as the Galpin Bottom, lying above the Missouri River Canal west of Milk River and Fort Peck Indian Reservation, with water supply by pumping from the Missouri River Canal, with a lift of about 20 feet; (7) 8,000 acres lying above the Missouri River Canal, east of Milk River, in the Fort Peck Indian Reservation, with water supply from pumping from the Missouri River Canal, with a lift of from 10 to 20 feet. The United States claims all waste, seepage, spring, and percolating water arising within the project and proposes to use such water in connection therewith.

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[1] Population less than 25

The Little Porcupine unit, with storage reservoir of 3,900 acre-feet capacity, has been completed to irrigate 2,330 acres. Poplar River West Canal B has been completed to irrigate 2,560 acres of allotted area, and Poplar River East Canal C to irrigate 5,330 acres of allotted land. The Big Porcupine unit to irrigate 4,000 acres of allotted land on the west boundary of the reservation, with a reservoir of 3,800 acre-feet capacity on the Middle Fork, has been completed. Work on the Big Muddy Creek canals was begun in the latter part of the year.

During the fiscal year 1919, work will be continued on the Big Muddy Creek Canal to complete a portion of this unit to furnish water to 4,000 acres of land, and further investigations will be carried on to determine the feasibility of using Medicine Lake for storage. Future work will include construction of storage works on Poplar River unit and extension of Poplar River canals, and the construction of the Missouri River Canal to irrigate 37,900 acres of allotted land along the Missouri River and adjacent to the Great Northern Railway, where the larger percentage of Indians have their homes.

SUMMARY OF GENERAL DATA FOR FORT PECK (INDIAN) PROJECT TO END OF FISCAL YEAR 1918.

Areas:		
Irrigable acreage when project is complete		152,000
Public land entered to end of fiscal year	9,713	
Public land open to entry at end of fiscal year	107	
State land	180	
Indian land	141,600	
Private land	400	
Acreage service could have supplied season of 1918		16,620
Estimated addition in fiscal year, 1919		4,000
Estimated acreage service can supply July 1, 1919		20,620
Acreage actually irrigated, season of 1917		1,602
Acreage cropped under irrigation, season of 1917		1,022
Crops:		
Value of irrigated crops, season of 1917		$19,858.00
Value of irrigated crops, per acre cropped		19.43
Finances:		
Net construction cost to end of fiscal year		$648,891.22
Per cent complete at end of fiscal year		11.5
Appropriated for fiscal year 1919 total		$50,000.00
Allotment for construction, fiscal year 1919		$50,000.00
Estimated per cent complete, June 30, 1919		12.5
Proposed appropriation, fiscal year 1920, for construction		$300,000.00
Estimated total construction cost to June 30, 1920		$1,008,209.86
Estimated per cent complete, June 30, 1920		20
Appropriation, fiscal year 1918		$100,000.00
Expenditures during fiscal year, chargeable to 1918 appropriation:		
Disbursements	$83,378.00	
Registered liabilities chargeable to 1918 appropriation	2,774.44	
Estimated engineering expenses on contract work wholly covered by 1918 appropriation		86,152.44
Unencumbered balance, July 1, 1918		13,847.56

CONSTRUCTION DURING FISCAL YEAR.

Construction for the fiscal year 1918 included the completion of the Big Porcupine storage dam; the beginning of excavation of the Big Muddy Creek Canal, and the construction of telephone line to connect the Big Porcupine Storage Dam with the telephone line of the Mountain States Telephone & Telegraph Co. line 4.5 miles to the west.

SEEPAGE AND DRAINAGE.

None of the project lands became damaged by seepage during the year and no drainage work was necessary.

OPERATION AND MAINTENANCE.

Water was available under the Little Porcupine unit and the west canal of the Poplar River unit early in the spring of 1917. Water delivery under the east canal of the Poplar River unit was delayed until July by the failure of the canal at mile 10 and the difficulty in obtaining sufficient labor to complete the new section of canal. A total of 1,602 acres were irrigated and a much larger area would have been covered but for the shortage of water in the Poplar River.

The rainfall for the calendar year 1917 was only 6.42 inches; the average for 32 years has been 13.51 inches. During the first 6 months of 1918 the rainfall was 3.93 inches. There has consequently been a demand for more water than could be delivered. The long dry period greatly reduced the flow of the Poplar River and very little water is available for irrigation.

Historical review, Fort Peck project.

Item.	1913	1914	1915	1916	1917	1918
Acreage for which service was prepared to supply water.	4,970	10,220	12,620	12,620	14,220	16,620
Acreage irrigated	410	1,004	1,100	1,092	1,602	[1] 1,800
Miles of canals operated	30	85	85	85	126	[1] 135
Water diverted (acre-feet)	800	2,000	3,000	3,500	3,600	[1] 3,000
Water delivered to land (acre-feet)	800	2,000	1,560	2,250	1,550	[1] 2,200
Per acre of land irrigated (acre-feet)	1.9	2.0	1.42	1.5	1.2	[1] 1.2

[1] Estimated.

SETTLEMENT.

In the spring of 1914 the unallotted grazing land on the reservation was opened to entry through a drawing in September, 1913. The settlement of this land was relatively slow during 1914 and 1915, but during the spring of 1916 a large number of entries were made, the desirable land being well taken up. In the spring of 1917, about 220,000 acres of unallotted land, previously withheld as mineral, were authorized to be appraised and opened for entry. Some of the Indians have received title to their land and a number of irrigable allotments have changed hands at prices ranging from $30 to $40 per acre. On the Poplar River unit, some of the Indians are moving onto their allotments and establishing homes.

Settlement data, Fort Peck project.

Item.	1914	1915	1916	1917	1918
Total number of allotments on project (irrigable)	1,780	1,780	1,780	1,780	1,780
Population (Indians)	1,991	2,046	2,092	2,130	2,160
Number of irrigated farms	29	42	48	58	[1] 65
Operated by owners or managers	26	40	46	57	[1] 63
Operated by tenants	3	2	2	1	2
Population	70	110	130	134	[1] 200
Number of towns	5	5	5	5	5
Population, white	1,440	1,780	2,200	2,650	[1] 3,500
Total population in towns and on farms	3,431	3,826	4,292	4,780	[1] 5,660
Number of schools:					
Indian	5	5	5	5	5
White	2	3	5	5	5
Number of churches	6	7	7	8	9
Number of banks	4	5	4	6	9
Total capital stock	$85,000	$105,000	$110,000	$130,000	$185,000
Amount of deposits	$223,000	$234,000	$477,000	$580,000	$1,095,000
Number of depositors	1,250	1,400	1,970	2,630	3,700

[1] Estimated.

PRINCIPAL CROPS.

The principal crops are oats, wheat, flax, vegetables, and bluejoint hay. Some of the Indians are turning their attention to alfalfa and several have sown small acreages on their irrigable allotments. Increased areas are farmed each year under both irrigation and dry farming. The greater number of the Indians have their homes along the Missouri River on land not yet under irrigation, and on which most of their farming is done. With favorable weather conditions good crops can be raised on this area by dry farming methods, but results for the past three years have been rather disappointing, so that more of the Indians have been turning their attention to the irrigable land on Little Porcupine and Poplar River units.

Crop report, Fort Peck (Indian) project, Montana, year of 1917.

Crop.	Area (acres).	Unit of yield.	Yields.		Values.		
			Total.	Average per acre.	Per unit of yield.	Total.	Per acre.
Alfalfa	10	Ton	20	2	$15.00	$300	$30.00
Flax	21	Bushel	180	8.6	3.00	540	25.71
Hay, blue joint	739	Ton	759	1.03	15.52	11,780	15.94
Oats	20	Bushel	800	40	.65	520	26.00
Wheat	115	...do	1,185	10.3	1.98	2,346	20.40
Potatoes	16	...do	1,425	89	1.80	2,565	160.00
Garden	26	Acres				1,197	46.04
Pasture	75	...do				610	8.13
Total cropped	1,022	Total and average				19,858	19.43

	Acres.
Irrigated, no crop	580
Total irrigated	1,602

FINANCIAL STATEMENT.

Project balance sheet, Fort Peck (Indian) project, June 30, 1918.

Cash		$50.60
Inventory of stock on hand		11,936.81
Accounts receivable		96.38
Construction cost	$650,441.75	
Less construction revenue earnings	1,550.53	
		648,891.22
Total		660,975.01
Accounts payable		4,422.47
Reserves for repayment of advances from reclamation fund		458,735.27
Capital investment:		
Disbursement, transfer, and joint construction vouchers received	$681,303.18	
Collection, transfer, refund, and joint construction vouchers issued	483,485.91	
Net investment		197,817.27
Total		660,975.01

Feature costs of Fort Peck (Indian) project to June 30, 1918.

Features.	Cost.	
	Fiscal year 1918.	Total to June 30, 1918.
Examinations and surveys:		
Missouri River Canal		$31,421.00
Project as a whole (stream gauging)	$490.89	1,786.24
Big Muddy unit		118.10
Poplar River unit	[1] 242.29	3,190.69
	248.60	36,516.03
Storage works:		
Big Porcupine Dam	81,194.41	100,308.37
Little Porcupine Reservoir		29,663.09
Poplar River Reservoir	1,827.36	1,827.36
	83,021.77	131,798.82
Canal system:		
Poplar River unit	[1] 5,419.27	206,945.88
Big Porcupine unit	[1] 1,272.69	63,999.01
Big Muddy unit	9,761.48	9,761.48
	3,069.52	280,706.37
Lateral system:		
Little Porcupine unit		24,210.48
Poplar River unit	[1] 1,299.44	53,477.15
Big Porcupine unit	[1] 692.92	72,665.03
Big Muddy unit		470.67
	[1] 1,992.36	150,823.33
Permanent improvements: Poplar River buildings		7,737.20
Telephone system: Big Porcupine unit	996.08	996.08
Operation and maintenance during construction (water-rental basis)	6,868.92	30,136.15
Subtotal	92,212.53	638,713.98
Balance in plant accounts	[1] 2,438.65	10,681.36
Unadjusted clearing accounts	1,046.41	1,046.41
Gross cost to June 30, 1918	90,820.29	650,441.75
Less revenues earned during construction period:		
Rental of buildings	21.20	404.71
Other revenues, unclassified	481.30	1,540.85
Losses on operations, unclassified	74.37	[1] 395.03
Total	576.87	1,550.53
Net cost		648,891.22

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[1] Deduct.

Statement of cost by calendar years, Fort Peck (Indian) project.

Year ending Dec. 31—	Construction.	Operation and maintenance during construction.	Total cost.
1908	$7,019.16		$7,019.16
1909	32,821.37		32,821.37
1910	85,382.50		85,382.50
1911	70,127.23		70,127.23
1912	17,110.85	$823.07	17,933.92
1913	117,299.74	2,410.22	119,709.96
1914	104,293.99	5,863.03	110,157.02
1915	26,645.61	2,113.23	28,758.84
1916	31,623.33	5,501.69	37,125.02
1917	86,344.04	11,533.34	97,877.38
June 30, 1918	29,910.01	1,891.57	31,801.58
Plant accounts			10,681.36
Unadjusted clearing accounts			1,046.41
Total	608,577.83	30,136.15	650,441.75

Statement of cost by fiscal years, Fort Peck (Indian) project.

Year ending June 30—	Construction.	Operation and maintenance during construction.	Total cost.
1909	$12,548.37		$12,548.37
1910	50,705.86		50,705.86
1911	117,180.84		117,180.84
1912	16,466.80	$188.89	16,655.69
1913	73,892.56	1,775.86	75,668.42
1914	109,713.74	3,984.28	113,698.02
1915	58,999.93	3,723.77	62,723.70
1916	31,200.90	4,911.75	36,112.65
1917	52,525.22	8,682.68	61,207.90
1918	85,343.61	6,868.92	92,212.53
Plant accounts			10,681.36
Unadjusted clearing accounts			1,046.41
Total	608,577.83	30,136.15	650,441.75

Estimated cost of contemplated work, Fort Peck project, during fiscal year 1919.

Examination and surveys: Stream gauging	$2,000
Storage works: Poplar River unit	3,000
Canal system: Big Muddy unit	45,400
Lateral system: Poplar River unit	3,000
Telephone system: Poplar River unit	1,600
Operation and maintenance during construction (water-rental basis)	10,000
Total	65,000

APPENDIX.

LEGISLATION.

THE NATIONAL IRRIGATION ACT.

An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands. (Act of June 17, 1902, ch. 1093, 32 Stat., 388.)

Sec. 1. [Reclamation fund established from public land receipts—Exception—Support of agricultural colleges—Deficiency.] That all moneys received from the sale and disposal of public lands in Arizona, California, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, South Dakota, Utah, Washington, and Wyoming, beginning with the fiscal year ending June thirtieth, nineteen hundred and one, including the surplus of fees and commissions in excess of allowances to registers and receivers, and excepting the five per centum of the proceeds of the sales of public lands in the above States set aside by law for educational and other purposes, shall be, and the same are hereby, reserved, set aside, and appropriated as a special fund in the Treasury to be known as the "reclamation fund," to be used in the examination and survey for and the construction and maintenance of irrigation works for the storage, diversion, and development of waters for the reclamation of arid and semiarid lands in the said States and Territories, and for the payment of all other expenditures provided for in this act: *Provided,* That in case the receipts from the sale and disposal of public lands other than those realized from the sale and disposal of lands referred to in this section are insufficient to meet the requirements for the support of agricultural colleges in the several States and Territories, under the act of August thirtieth, eighteen hundred and ninety, entitled "An act to apply a portion of the proceeds of the public lands to the more complete endowment and support of the colleges for the benefit of agriculture and the mechanic arts, established under the provisions of an act of Congress approved July second, eighteen hundred and sixty-two," the deficiency, if any, in the sum necessary for the support of the said colleges shall be provided for from any moneys in the Treasury not otherwise appropriated. [*32 Stat., 388.*]

Sec. 2. [Authority to locate and construct irrigation works—Report to Congress.] That the Secretary of the Interior is hereby authorized and directed to make examinations and surveys for, and to locate and construct, as herein provided, irrigation works for the storage, diversion, and development of waters, including artesian wells, and to report to Congress at the beginning of each regular session as to the results of such examinations and surveys, giving estimates of cost of all contemplated works, the quantity and location of the lands which can be irrigated therefrom, and all facts relative to the practicability of each irrigation project; also the cost of works in process of construction as well as of those which have been completed. [*32 Stat., 388.*]

Sec. 3. **[Withdrawal of lands for irrigation works—Withdrawal of lands susceptible of irrigation—Homestead entries—Determination whether project is practicable—Restoration and entry—Commutation.]** That the Secretary of the Interior shall, before giving the public notice provided for in section four of this act, withdraw from public entry the lands required for any irrigation works contemplated under the provisions of this act, and shall restore to public entry any of the lands so withdrawn when, in his judgment, such lands are not required for the purposes of this act; and the Secretary of the Interior is hereby authorized, at or immediately prior to the time of beginning the surveys for any contemplated irrigation works, to withdraw from entry, except under the homestead laws, any public lands believed to be susceptible of irrigation from said works: *Provided,* That all lands entered and entries made under the homestead laws within areas so withdrawn during such withdrawal shall be subject to all the provisions, limitations, charges, terms, and conditions of this act; that said surveys shall be prosecuted diligently to completion, and upon the completion thereof, and of the necessary maps, plans, and estimates of cost, the Secretary of the Interior shall determine whether or not said project is practicable and advisable, and if determined to be impracticable or unadvisable he shall thereupon restore said lands to entry; that public lands which it is proposed to irrigate by means of any contemplated works shall be subject to entry only under the provisions of the homestead laws in tracts of not less than forty nor more than one hundred and sixty acres, and shall be subject to the limitations, charges, terms, and conditions herein provided: *Provided,* That the commutation provisions of the homestead laws shall not apply to entries made under this act. [*32 Stat., 388.*]

Sec. 4. **[Contracts for construction—Public notice of irrigable lands, limit of area, charges per acre, and method of payment—Limit of work hours—Mongolian labor.]** That upon the determination by the Secretary of the Interior that any irrigation project is practicable, he may cause to be let contracts for the construction of the same, in such portions or sections as it may be practicable to construct and complete as parts of the whole project, providing the necessary funds, for such portions or sections are available in the reclamation fund, and thereupon he shall give public notice of the lands irrigable under such project, and limit of area per entry, which limit shall represent the acreage which, in the opinion of the Secretary, may be reasonably required for the support of a family upon the lands in question; also of the charges which shall be made per acre upon the said entries, and upon lands in private ownership which may be irrigated by the waters of the said irrigation project, and the number of annual installments, not exceeding ten, in which such charges shall be paid and the time when such payments shall commence. The said charges shall be determined with a view of returning to the reclamation fund the estimated cost of construction of the project, and shall be apportioned equitably: *Provided,* That in all construction work eight hours shall constitute a day's work, and no Mongolian labor shall be employed thereon. [*32 Stat., 389.*]

Sec. 5. **[Requirements of entrymen—Limit of 160 acres—Residence—Payments—Disposal of receipts—Commissions.]** That the entryman upon lands to be irrigated by such works shall, in addition to compliance with the homestead laws, reclaim at least one-half of the total irrigable area of his entry for agricultural purposes, and before receiving patent for the lands covered by his entry shall pay to the Government the charges apportioned against such tract, as provided in section four. No right to the use of water for land in private ownership shall be sold for a tract exceeding one hundred and sixty acres to any one landowner, and no such sale shall be made to any landowner unless he be an actual bona fide resident on such land, or occupant thereof residing in the neighborhood of said land, and no such right shall permanently attach until all payments therefor are made. The annual installments shall be paid to the receiver of the local land office of the district in which the land is situated, and a failure to make any two payments when due shall render the entry subject to cancellation, with the forfeiture of all rights under this act, as well as of any moneys already paid thereon. All moneys received from the above sources shall be paid into the reclamation fund. Registers and receivers shall be allowed the usual commissions on all moneys paid for lands entered under this act. [*32 Stat., 389.*]

Sec. 6. **[Reclamation fund to be used for operation and maintenance—Management of works to pass to landowners—Title.]** That the Secretary of the Interior is hereby authorized and directed to use the reclamation fund for the operation and maintenance of all reservoirs and irrigation works constructed under the provisions of this act: *Provided,* That when the payments required by this act are made for the major portion of the lands irrigated from the waters of any of the works herein provided for, then the management and operation of such irrigation works shall pass to the owners of the lands irrigated thereby, to be maintained at their expense under such form of organization and under such rules and regulations as may be acceptable to the Secretary of the Interior: *Provided,* That the title to and the management and operation of the reservoirs and the works necessary for their protection and operation shall remain in the Government until otherwise provided by Congress. [*32 Stat., 389.*]

Sec. 7. **[Authority to acquire property—Attorney General to institute condemnation proceedings.]** That where in carrying out the provisions of this act it becomes necessary to acquire any rights or property, the Secretary of the Interior is hereby authorized to acquire the same for the United States by purchase or by condemnation under judicial process, and to pay from the reclamation fund the sums which may be needed for that purpose, and it shall be the duty of the Attorney General of the United States upon every application of the Secretary of the Interior, under this act, to cause proceedings to be commenced for condemnation within thirty days from the receipt of the application at the Department of Justice. [*32 Stat., 389.*]

Sec. 8. **[Irrigation laws of States and Territories not affected—Interstate streams—Water rights.]** That nothing in this act shall be construed as affecting or intended to affect or to in any way interfere with the laws of any State or Territory relating to the control, appropriation, use, or distribution of water used in irrigation, or any vested right acquired thereunder, and the Secretary of the Interior, in carrying out the provisions of this act, shall proceed in conformity with such laws, and nothing herein shall in any way affect any right of any State or of the Federal Government or of any landowner, appropriator, or user of water in, to, or from any interstate stream or the waters thereof: *Provided,* That the right to the use of water acquired under the provisions of this act shall be appurtenant to the land irrigated and beneficial use shall be the basis, the measure, and the limit of the right. [*32 Stat., 390.*]

Sec. 9. [Repealed by section 6, act of June 25, 1910, 36 Stat., 835.]

Sec. 10. [Authority to make rules and regulations.] That the Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this act into full force and effect. [*32 Stat., 390.*]

THE EXTENSION ACT.

An act extending the period of payment under reclamation projects, and for other purposes. (Act Aug. 13, 1914, ch. 247, 38 Stat., 686.)

Sec. 1. [Payments of construction charges under future rights—Entry before charge is established.] That any person whose lands hereafter become subject to the terms and conditions of the act approved June seventeenth, nineteen hundred and two, entitled "An act appropriating the receipts from the sale and disposal of public lands in certain States and Territories to the construction of irrigation works for the reclamation of arid lands," and acts amendatory thereof or supplementary thereto, hereafter to be referred to as the reclamation law, and any person who hereafter makes entry thereunder shall at the time of making water-right application or entry, as the case may be, pay into the reclamation fund five per centum of the construction charge fixed for his land as an initial installment, and shall pay the balance of said charge in fifteen annual installments, the first five of which shall each be five per centum of the construction charge and the remainder shall each be seven per centum until the whole amount shall have been paid. The first of the annual installments shall become due and payable on December first of the fifth calendar year after the initial installment: *Provided,* That any water-right applicant or entryman may, if he so elects, pay the whole or any part of the construction charges owing by him within any shorter period: *Provided further,* That entry may be made whenever water is available, as announced by the Secretary of the Interior, and the initial payment be made when the charge per acre is established. [*38 Stat., 686.*]

Sec. 2. [Payments of construction charges under existing rights.] That any person whose land or entry has heretofore become subject to the terms and conditions of the reclamation law shall pay the construction charge, or the portion of the construction charge remaining unpaid, in twenty annual installments, the first of which shall become due and payable on December first of the year in which the public notice affecting his land is issued under this act, and subsequent installments on December first of each year thereafter. The first four of such installments shall each be two per centum, the next two installments shall each be four per centum, and the next fourteen each six per centum of the total construction charge, or the portion of the construction charge unpaid at the beginning of such installments. [*38 Stats., 687.*]

Sec. 3. **[Penalties for nonpayment of construction charges—Cancellation and forfeiture—Actions for recovery.]** That if any water-right applicant or entryman shall fail to pay any installment of his construction charges when due, there shall be added to the amount unpaid a penalty of one per centum thereof, and there shall be added a like penalty of one per centum of the amount unpaid on the first day of each month thereafter so long as such default shall continue. If any such applicant or entryman shall be one year in default in the payment of any installment of the construction charges and penalties, or any part thereof, his water-right application, and if he be a homestead entryman his entry also, shall be subject to cancellation, and all payments made by him forfeited to the reclamation fund, but no homestead entry shall be subject to contest because of such default: *Provided,* That if the Secretary of the Interior shall so elect, he may cause suit or action to be brought for the recovery of the amount in default and penalties; but if suit or action be brought, the right to declare a cancellation and forfeiture shall be suspended pending such suit or action. [*38 Stat., 687.*]

Sec. 4. **[Restriction on increasing construction charges—Time for paying increase—Charges subject to certain conditions.]** That no increase in the construction charges shall hereafter be made, after the same have been fixed by public notice, except by agreement between the Secretary of the Interior and a majority of the water-right applicants and entrymen to be affected by such increase, whereupon all water-right applicants and entrymen in the area proposed to be affected by the increased charge shall become subject thereto. Such increased charge shall be added to the construction charge and payment thereof distributed over the remaining unpaid installments of construction charges: *Provided,* That the Secretary of the Interior, in his discretion, may agree that such increased construction charge shall be paid in additional annual installments, each of which shall be at least equal to the amount of the largest installment as fixed for the project by the public notice theretofore issued. And such additional installments of the increased construction charge, as so agreed upon, shall become due and payable on December first of each year subsequent to the year when the final installment of the construction charge under such public notice is due and payable: *Provided further,* That all such increased construction charges shall be subject to the same conditions, penalties, and suit or action as provided in section three of this act. [*38 Stat., 687.*]

Sec. 5. **[Operation and maintenance charges—Basis therefor—Minimum charge—Secretary may transfer care and operation of project—Reduction or increase of charges.]** That in addition to the construction charge, every water-right applicant, entryman, or landowner under or upon a reclamation project shall also pay, whenever water service is available for the irrigation of his land, an operation and maintenance charge based upon the total cost of operation and maintenance of the project, or each separate unit thereof, and such charge shall be made for each acre-foot of water delivered; but each acre of irrigable land, whether irrigated or not, shall be charged with a minimum operation and maintenance charge based upon the charge for delivery of not less than one acre-foot of water: *Provided,* That whenever any legally organized water users' association or irrigation district shall so request, the Secretary of the Interior is hereby authorized, in his discretion, to transfer to such water users' association or irrigation district the care, operation, and maintenance of all or any part of the project works, subject to such rules and regulations as he may prescribe. If the total amount of operation and maintenance charges and penalties collected for any one irrigation season on any project shall exceed the cost of operation and maintenance of the project during that irrigation season, the balance shall be applied to a reduction of the charge on the project for the next irrigation season, and any deficit incurred may likewise be added to the charge for the next irrigation season. [*38 Stat., 687.*]

Sec. 6. **[Date when charges become due fixed by the Secretary—Discount for prompt payment—Penalty for nonpayment—Cancellation for continued arrears—Actions for recovery.]** That all operation and maintenance charges shall become due and payable on the date fixed for each project by the Secretary of the Interior, and if such charge is paid on or before the date when due there shall be a discount of five per centum of such charge; but if such charge is unpaid on the first day of the third calendar month thereafter, a penalty of one per centum of the amount unpaid shall be added thereto, and thereafter an additional penalty of one per centum of the amount unpaid shall be added on the first day of each calendar month if such charge and penalties shall remain unpaid, and no water shall be delivered to the lands of any water-right applicant or entryman who shall be in arrears for more than one calendar year for the payment of any charge for operation and maintenance or any annual construction charge and penalties. If any water-right applicant or entryman shall be one year in arrears in the payment of any charge for operation and maintenance and penalties, or any part thereof, his water-right application, and if he be a homestead entryman his entry also, shall be subject to cancellation, and all payments made by him forfeited to the reclamation fund, but no homestead entry shall be subject to contest because of such arrears. In the discretion of the Secretary of the Interior suit or action may be brought for the amounts in default and penalties in like manner as provided in section three of this act. [*38 Stat., 688.*]

Sec. 7. **[Local association may be appointed fiscal agent for the United States to collect charges—Official receipt.]** That the Secretary of the Interior is hereby authorized, in his discretion, to designate and appoint, under such rules and regulations as he may prescribe, the legally organized water users' association or irrigation district, under any reclamation project, as the fiscal agent of the United States to collect the annual payments on the construction charge of the project and the annual charges for operation and maintenance and all penalties: *Provided*, That no water-right applicant or entryman shall be entitled to credit for any payment thus made until the same shall have been paid over to an officer designated by the Secretary of the Interior to receive the same. [*38 Stat., 688.*]

Sec. 8. **[Authority to make regulations governing use of water, reclamation, and cultivation—Penalty for noncompliance with regulations.]** That the Secretary of the Interior is hereby authorized to make general rules and regulations governing the use of water in the irrigation of the lands within any project, and may require the reclamation for agricultural purposes and the cultivation of one-fourth the irrigable area under each water-right application or entry within three full irrigation seasons after the filing of water-right application or entry, and the reclamation for agricultural purposes and the cultivation of one-half the irrigable area within five full irrigation seasons after the filing of the water-right application or entry, and shall provide for continued compliance with such requirements. Failure on the part of any water-right applicant or entryman to comply with such requirements shall render his application or entry subject to cancellation. [*38 Stat., 688.*]

Sec. 9. **[Additional construction charges for certain lands.]** That in all cases where application for water right for lands in private ownership or lands held under entries not subject to the reclamation law shall not be made within one year after the passage of this act, or within one year after notice issued in pursuance of section four of the reclamation act, in cases where such notice has not heretofore been issued, the construction charges for such land shall be increased five per centum each year until such application is made and an initial installment is paid. [*38 Stat., 689.*]

Sec. 10. **[Entries prior to June 25, 1910—Disposal of relinquished lands.]** That the act of Congress approved February eighteenth, nineteen hundred and eleven, entitled "An act to amend section five of the act of Congress of June twenty-fifth, nineteen hundred and ten, entitled 'An act to authorize advances to the reclamation fund and for the issuance and disposal of certificates of indebtedness in reimbursement therefor, and for other purposes,'" be, and the same hereby is, amended so as to read as follows:

"Sec. 5. That no entry shall be hereafter made and no entryman shall be permitted to go upon lands reserved for irrigation purposes until the Secretary of the Interior shall have established the unit of acreage per entry, and water is ready to be delivered for the land in such unit or some part thereof and such fact has been announced by the Secretary of the Interior: *Provided*, That where entries made prior to June twenty-fifth, nineteen hundred and ten, have been or may be relinquished, in whole or in part, the lands so relinquished shall be subject to settlement and entry under the reclamation law." [*38 Stat., 689.*]

Sec. 11. **[Furnishing water before regular rates are fixed.]** That whenever water is available and it is impracticable to apportion operation and maintenance charges as provided in section five of this act, the Secretary of the Interior may, prior to giving public notice of the construction charge per acre upon land under any project, furnish water to any entryman or private landowner thereunder until such notice is given, making a reasonable charge therefor, and such charges shall be subject to the same penalties and to the provisions for cancellation and collection as herein provided for other operation and maintenance charges. [*38 Stat., 689.*]

Sec. 12. **[Owners of private lands under new projects must dispose of excess area—Lands excluded upon refusal.]** That before any contract is let or work begun for the construction of any reclamation project hereafter adopted the Secretary of the Interior shall require the owners of private lands thereunder to agree to dispose of all lands in excess of the area which he shall deem sufficient for the support of a family upon the land in question, upon such terms and at not to exceed such price as the Secretary of the Interior may designate; and if any landowner shall refuse to agree to the requirements fixed by the Secretary of the Interior, his land shall not be included within the projects if adopted for construction. [*38 Stat., 689.*]

Sec. 13. [**Entries to be reduced to single farm units—Time for making proof—Cancellation of excess entries—Issue of patents—Assignments restricted.**] That all entries under reclamation projects containing more than one farm unit shall be reduced in area and conformed to a single farm unit within two years after making proof of residence, improvement, and cultivation, or within two years after the issuance of a farm-unit plat for the project, if the same issues subsequent to the making of such proof: *Provided,* That such proof is made within four years from the date as announced by the Secretary of the Interior that water is available for delivery for the land. Any entryman failing within the period herein provided to dispose of the excess of his entry above one farm unit, in the manner provided by law, and to conform his entry to a single farm unit shall render his entry subject to cancellation as to the excess above one farm unit: *Provided,* That upon compliance with the provisions of law such entryman shall be entitled to receive a patent for that part of his entry which conforms to one farm unit as established for the project: *Provided further,* That no person shall hold by assignment more than one farm unit prior to final payment of all charges for all the land held by him subject to the reclamation law, except operation and maintenance charges not then due. [*38 Stat., 690.*]

Sec. 14. [**Acceptance of extension of payments to be made within six months.**] That any person whose land or entry has heretofore become subject to the reclamation law, who desires to secure the benefits of the extension of the period of payments provided by this act, shall, within six months after the issuance of the first public notice hereunder affecting his land or entry, notify the Secretary of the Interior, in the manner to be prescribed by said Secretary, of his acceptance of all of the terms and conditions of this act, and thereafter his lands or entry shall be subject to all of the provisions of this act. [*38 Stat., 690.*]

Sec. 15. [**General authority.**] That the Secretary of the Interior is hereby authorized to perform any and all acts and to make such rules and regulations as may be necessary and proper for the purpose of carrying the provisions of this act into full force and effect. [*38 Stat., 690.*]

Sec. 16. [**Expenditures after July 1, 1915, limited to specific appropriations—To be paid out of reclamation fund.**] That from and after July first, nineteen hundred and fifteen, expenditures shall not be made for carrying out the purposes of the reclamation law except out of appropriations made annually by Congress therefor, and the Secretary of the Interior shall, for the fiscal year nineteen hundred and sixteen, and annually thereafter, in the regular Book of Estimates, submit to Congress estimates of the amount of money necessary to be expended for carrying out any or all of the purposes authorized by the reclamation law, including the extension and completion of existing projects and units thereof and the construction of new projects. The annual appropriations made hereunder by Congress for such purposes shall be paid out of the reclamation fund provided for by the reclamation law. [*38 Stat., 690.*]

SUSPENSION OF RESIDENCE REQUIREMENTS DURING WAR.

(Extracts from) An act to provide further for the national security and defense by stimulating agriculture and facilitating the distribution of agricultural products. (Act of Aug. 10, 1917, ch. 52, 40 Stat., 273.)

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Sec. 11. [Suspension of residence requirements.] That the Secretary of the Interior is hereby authorized, in his discretion, to suspend during the continuance of this act that provision of the act known as the "reclamation act" requiring residence upon lands in private ownership or within the neighborhood for securing water for the irrigation of the same, and he is authorized to permit the use of available water thereon upon such terms and conditions as he may deem proper. [*40 Stat., 276.*]

Sec. 12. [Duration of suspension.] That the provisions of this act shall cease to be in effect when the national emergency resulting from the existing state of war shall have passed, the date of which shall be ascertained and proclaimed by the President; but the date when this act shall cease to be in effect shall not be later than the beginning of the next fiscal year after the termination, as ascertained by the President, of the present war between the United States and Germany. [*40 Stat., 276.*]

RECEIPTS FROM POTASSIUM DEPOSITS TO BE PAID INTO RECLAMATION FUND.

(Extract from) An act to authorize exploration for and disposition of potassium. (Act of Oct. 2, 1917, ch. 62, 40 Stat., 297.)

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Sec. 10. [Disposal of receipts from potassium deposits.] That all moneys received from royalties and rentals under the provisions of this act, excepting those from Alaska, shall be paid into, reserved, and appropriated as a part of the reclamation fund created by the act of Congress approved June seventeenth, nineteen hundred and two, known as the reclamation act, but after use thereof in the construction of reclamation works and upon return to the reclamation fund of any such moneys in the manner provided by the reclamation act and acts amendatory thereof and supplemental thereto, fifty per centum of the amounts derived from such royalties and rentals, so utilized in and returned to the reclamation fund shall be paid by the Secretary of the Treasury after the expiration of each fiscal year to the State within the boundaries of which the leased lands or deposits are or were located, said moneys to be used by such State or subdivisions thereof for the construction and maintenance of public roads or for the support of public schools. [*40 Stat. 300.*]

DRAINAGE ON RIO GRANDE PROJECT.

Joint resolution to authorize the Secretary of Interior to expend funds in New Mexico and Texas for drainage purposes. (Resolution of Oct. 6, 1917, ch. 107, 40 Stat., 426.)

[Drainage expenditures allowed.] That in order to provide for immediate and necessary drainage of lands in the Rio Grande reclamation project, New Mexico and Texas, the provisions of the sundry civil act, approved June twelfth, nineteen hundred and seventeen, as far as applicable to said project, are hereby modified and amended so as to authorize and permit the Secretary of the Interior to expend not exceeding $15,000 in drainage work upon that portion of the project located within the State of New Mexico pending the formation of an irrigation district covering the lands within New Mexico under this project, and to expend upon that portion of the project located within the State of Texas such amount, within the limit of available appropriations, as the existing irrigation district may obligate itself to repay. [*40 Stat., 426.*]

AMENDMENT OF YUMA MESA ACT.

An act to amend section four of the act entitled "An act to provide for an auxiliary reclamation project in connection with the Yuma project, Arizona." (Act of Feb. 11, 1918, ch. —, 40 Stat., —.)

Sec. 1. [Availability of fund.] That the first sentence of section four of the act entitled "An act to provide for an auxiliary reclamation project in connection with the Yuma project, Arizona," approved January twenty-fifth, nineteen hundred and seventeen, be amended so as to read as follows:

"That the money in said auxiliary reclamation fund of the Yuma project, Arizona, shall be available for the construction or completion of irrigation works of the said auxiliary project or unit." [*40 Stat.,* —.]

SOLDIERS' AND SAILORS' CIVIL RELIEF ACT.

(Extract from) An act to extend protection to the civil rights of members of the Military and Naval Establishments of the United States engaged in the present war. (Act of March 8, 1918, Public No. 103.)

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Sec. 500. [Unpaid taxes and assessments of person in military service—Affidavit to be filed—Collection stayed—Right of redemption when property sold—Interest to be paid.] (1) That the provisions of this section shall apply when any taxes or assessments, whether general or special, falling due during the period of military service in respect of real property owned and occupied for dwelling or business purposes by a person in military service or his dependents at the commencement of his period of military service and still so occupied by his dependents or employees are not paid.

(2) When any person in military service, or any person in his behalf, shall file with the collector of taxes, or other officer whose duty it is to enforce the collection of taxes or assessments, an affidavit showing (*a*) that a tax or assessment has been assessed upon property which is the subject of this section, (*b*) that such tax or assessment is unpaid, and (*c*) that by reason of such military service the ability of such person to pay such tax or assessment is materially affected, no sale of such property shall be made to enforce the collection of such tax or assessment, or any proceeding or action for such purpose commenced, except upon leave of court granted upon an application made therefor by such collector or other officer. The court thereupon may stay such proceedings of such sale, as provided in this Act, for a period extending not more than six months after the termination of the war.

(3) When by law such property may be sold or forfeited to enforce the collection of such tax or assessment, such person in military service shall have the right to redeem or commence an action to redeem

such property, at any time not later than six months after the termination of such service, but in no case later than six months after the termination of the war; but this shall not be taken to shorten any period, now or hereafter provided by the laws of any State or Territory for such redemption.

(4) Whenever any tax or assessment shall not be paid when due, such tax or assessment due and unpaid shall bear interest until paid at the rate of six per centum per annum, and no other penalty or interest shall be incurred by reason of such nonpayment. Any lien for such unpaid taxes or assessment shall also include such interest thereon.

Sec. 501. [Interest in public lands of person in military service—Rights protected—Benefits of other acts not affected—Previous rights of action not limited—Proofs before officer in command.] That no right to any public lands initiated or acquired prior to entering military service by any person under the homestead laws, the desert-land laws, the mining-land laws, or any other laws of the United States, shall be forfeited or prejudiced by reason of his absence from such land, or of his failure to perform any work or make any improvements thereon, or to do any other act required by any such law during the period of such service. Nothing in this section contained shall construed to deprive a person in military service or his heirs or devicees of any benefits to which he or they may be entitled under the Act entitled "An Act for the relief of homestead entrymen or settlers who enter the military or naval service of the United States in time of war," approved July twenty-eighth, nineteen hundred and seventeen; the Act entitled "An Act for the protection of desert-land entrymen who enter the military or naval service of the United States in time of war." approved August seventh, nineteen hundred and seventeen; the Act entitled "An Act to provide further for the national security and defense by stimulating agriculture and facilitating the distribution of agricultural products," approved August tenth, nineteen hundred and seventeen; the joint resolution "To relieve the owners of mining claims who have been mustered into the military or naval service of the United States as officers or enlisted men from performing assessment work during the term of such service," approved July seventeenth, nineteen hundred and seventeen; or any other Act or resolution of Congress: *Provided,* That nothing in this section contained shall be construed to limit or affect the right of a person in the military service to take any action during his term of service that may be authorized by law, or the regulations of the Interior Department thereunder, for the perfection, defense, or further assertion of rights initiated prior to the date of entering military service, and it shall be lawful for any person while in military service to make any affidavit or submit any proof that may be required by law, or the practice of the General Land Office in connection with the entry, perfection, defense, or further assertion of any rights initiated prior to entering military service, before the officer in immediate command and holding a commission in the branch of the service in which the party is engaged, which affidavit shall be as binding in law and with like penalties as if taken before the Register of the United States Land office."

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APPROPRIATION FOR UNITED STATES RECLAMATION SERVICE, FISCAL YEAR 1919.

(Extract from) An act making appropriations for sundry civil expenses of the Government for the fiscal year ending June 30, 1919, and for other purposes. (Act of July 1, 1918, Public No. 181.)

* * * * * * *

The following sums are appropriated out of the special fund in the Treasury of the United States created by the Act of June seventeenth, nineteen hundred and two, and therein designated "the reclamation fund":

For all expenditures authorized by the Act of June seventeenth, nineteen hundred and two (Thirty-second Statutes, page three hundred and eighty-eight), and Acts amendatory thereof and supplementary thereto, known as the reclamation law, and all other Acts under which expenditures from said fund are authorized, including salaries in the District of Columbia and elsewhere; rent of office quarters in the District of Columbia, $8,040, and for rent elsewhere; examination of estimates for appropriations in the field; printing and binding; law books, books of reference, periodicals, engineering and statistical publications, not exceeding $1,500; purchase, maintenance, and operation of horse-drawn or motor-propelled passenger-carrying vehicles; payment of damages caused to the owners of lands of private property of any kind by reason of the operations of the United States, its officers or employees, in the survey, construction, operation, or maintenance of irrigation works, and which may be compromised by agreement between the claimant and the Secretary of the Interior, and payment for official telephone service and rental in the field hereafter incurred in case of official telephones installed in private houses when authorized under regulations established by the Secretary of the Interior, namely:

Salt River project, Arizona: For maintenance, operation, continuation of construction, and incidental operations, $797,000;

Yuma project, Arizona-California: For maintenance, operation, continuation of construction, and incidental operations, $590,000;

Orland project, California: For maintenance, operation, continuation of construction, and incidental operations, $95,000;

Grand Valley project, Colorado: For maintenance, operation, continuation of construction, and incidental operations, $348,000;

Uncompahgre project, Colorado: For maintenance, operation, continuation of construction, and incidental operation, $185,000;

Boise project, Idaho: For maintenance, operation, continuation of construction, and incidental operations, $732,000: *Provided*, That no money shall be expended for extensions of the Boise project, except such amounts as may be collected from construction charges on that project under public notice;

King Hill project, Idaho: For continuing construction and incidental operations, $423,000: *Provided*, That said project shall be subject to the reclamation Act of June seventeenth, nineteen hundred and two, and all Acts amendatory thereof or supplementary thereto, so far as applicable and consistent with contract heretofore made between the United States and King Hill irrigation district: *Provided further*, That for the purposes of issuing patent to lands reclaimed, the reclamation effected by the operations of the United States Reclamation Service may be considered by the Secretary of the Interior as equivalent to reclamation effected by the State of Idaho, under the Carey Act of August eighteenth, eighteen hundred and ninety-four.

Minidoka project, Idaho: For maintenance, operation, continuation of construction, and incidental operations, $489,000;

Huntley project, Montana: For maintenance, operation, continuation of construction, and incidental operations, $112,000;

Milk River project, Montana: For maintenance, operation, continuation of construction, and incidental operations, $186,000, together with the unexpended balance of the appropriation for this project for the fiscal year nineteen hundred and eighteen;

Sun River project, Montana: For maintenance, operation, continuation of construction, and incidental operations, $222,000, together with $100,000 of the unexpended balance of the appropriation for this project for the fiscal year nineteen hundred and sixteen;

Lower Yellowstone project, Montana-North Dakota: For maintenance, operation, and incidental operations, $55,000;

North Platte project, Nebraska-Wyoming: For maintenance, operation, continuation of construction, and incidental operations, $881,000, together with the unexpended balance of the sum appropriated for this project for the fiscal year nineteen hundred and eighteen;

Truckee-Carson project, Nevada: For maintenance, operation, continuation of construction, and incidental operations, $671,000, together with the unexpended balance of the sum appropriated for this project for the fiscal year nineteen hundred and eighteen;

Carlsbad project, New Mexico: For maintenance, operation, continuation of construction, and incidental operations, $75,000;

Rio Grande project, New Mexico-Texas: For maintenance, operation, continuation of construction, and incidental operations, $1,296,000, together with the unexpended balance of the sum appropriated for this project for the fiscal year nineteen hundred and eighteen: *Provided*, That no part of this appropriation shall be expended for drainage except in irrigation districts formed under State laws and upon the execution of agreements for the repayment to the United States of all project investments;

North Dakota pumping project, North Dakota: For maintenance, operation, and incidental operations, $64,000;

Lawton project, Oklahoma: For continuation of investigation $[illegible],000;

Umatilla project, Oregon: For maintenance, operation, continuation of construction, and incidental operations, $80,000, together with the unexpended balance of the appropriation for this project for the fiscal year nineteen hundred and eighteen;

Klamath project, Oregon-California: For maintenance, operation, continuation of construction, and incidental operations, $423,000;

Belle Fourche project, South Dakota: For maintenance, operation, continuation of construction, and incidental operations, $262,000;

Strawberry Valley project, Utah: For maintenance, operation, and incidental operations, $59,000, together with the unexpended balance of the appropriation for this project for the fiscal year nineteen hundred and eighteen;

Okanogan project, Washington: For construction, maintenance, operation, and incidental operations, $154,000;

Yakima project, Washington: For maintenance, operation, continuation of construction, and incidental operations, $645,000, together with the unexpended balance of the appropriation for this project for the fiscal year nineteen hundred and eighteen;

Shoshone project, Wyoming: For maintenance, operation, continuation of construction, and incidental operations, $400,000 together with the unexpended balance of the sum appropriated for this project for the fiscal year nineteen hundred and eighteen;

Secondary projects: For cooperative and other miscellaneous investigations, $100,000;

Under the provisions of this Act no greater sum shall be expended, nor shall the United States be obligated to expend, during the fiscal year nineteen hundred and nineteen, on any reclamation project appropriated for herein an amount in excess of the sum herein appropriated therefor, nor shall the whole expenditures or obligations incurred for all of such projects for the fiscal year nineteen hundred and nineteen exceed the whole amount in the "reclamation fund" for that fiscal year;

Ten per centum of the foregoing amounts shall be available interchangeably for expenditure on the reclamation projects named; but not more than ten per centum shall be added to the amount appropriated for any one of said projects;

Hereafter the purchase of supplies and the procurement of services for the Reclamation Service may be made in open market in the manner common among business men, without advertising and formal contract, when the aggregate of the amount required does not exceed $50, and when, in the opinion of the Director of the Reclamation Service, such limitations of amount are not designed to evade the purchase of supplies and the procurement of services under advertising and formal contract, and equally or more advantageous terms can thereby be secured.

In all, Reclamation Service, $9,345,000.

For reimbursement to the reclamation fund the proportionate expense of operation and maintenance of the reservoirs for furnishing stored water to the lands in Yakima Indian Reservation, Washington, in accordance with the provisions of section twenty-two of the Act of August first, nineteen hundred and fourteen (Thirty-eighth Statutes, page six hundred and four), there is appropriated, out of any money in the Treasury not otherwise appropriated, $10,160.

For an investigation to be made by the Director of the Reclamation Service of the reclamation by drainage of lands outside existing reclamation projects and of the reclamation and preparation for cultivation of cut-over timber lands in any of the States of the United States, including personal services in the District of Columbia and elsewhere, purchase, maintenance, repair, hire, and operation of motor-propelled or horse-drawn passenger vehicles, and for all other expenses, there is appropriated, out of any money in the Treasury not otherwise appropriated, $100,000.

LAW DECISIONS.

ENTRIES AND ENTRYMEN.

Abandonment of entry.—The failure of an entryman on arid lands withdrawn under the reclamation act of June 17, 1902 (32 Stat., 388), as susceptible of irrigation, to continuously reside upon or cultivate the land, which, though later withdrawn for irrigation works, was finally released during the time when no reclamation project has been devised or installed, can not be deemed an abandonment; the act of June 27, 1906 (34 Stat., 520), expressly saving such cases, and the entryman having prepared the land for cultivation and established a residence thereon. (Edwards *v.* Bodkin, 249 Fed., 562.)

Devolution of reclamation entryman's interest.—Upon the death of an entryman who has made satisfactory homestead final proof on a reclamation farm unit, the homestead becomes a part of his estate and as such subject to distribution, and is not an unperfected entry subject to the provisions of section 2291, Revised Statutes. The condition imposed by the reclamation act as to reclamation, payment of charges, and filing of water-right application are conditions not of homestead law or proof, but arising out of reclamation and imposed as a further requirement. (Heirs of Wm. L. Naftzger 46 L. D., 61.)

Entry initiated by settlement.—Entry of lands within a reclamation project can be initiated by settlement. In section 3 of the reclamation act of July 17, 1902 (32 Stat., 388), the word "only," in the proviso that "public lands which it is proposed to irrigate by means of any contemplated works shall be subject to entry only under the provisions of the homestead laws," applies to and qualifies the clause "under the provisions of the homestead law." (Chapman *v.* Pervier, 46 L. D., 113.)

Preferential right to withdrawn land.—Under the act of May 14, 1880 (ch. 89, 21 Stat., 140), providing that where any person has contested and procured the cancellation of any homestead entry he shall be allowed 30 days to enter the lands, where the Department of the Interior entertained a contest while the land involved was withdrawn from entry under reclamation act June 17, 1902 (ch. 1093, 32 Stat., 388), it properly permitted the successful contestant to enter the lands within 30 days after the restoration of such lands to entry. (Edwards *v.* Bodkin, 241 Fed., 931, citing Secretary's Regulations of June 6, 1905, 33 L. D., 607, and coinciding with Fairchild *v.* Eby (37 L. D., 362), Beach *v.* Hanson (40 L. D., 607), Wright *v.* Francis (36 L. D., 499), and Edwards *v.* Bodkin (42 L. D., 172).)

Rights of entryman under departmental regulations.—While section 10 of the reclamation act authorizes the Secretary of the Interior to make such regulations as may be necessary and proper to carry the act into full force and effect, he is not authorized to amend, modify, or change the act of May 14, 1880 (21 Stat., 141), fixing the rights of a successful contestant who has secured the cancellation of any preemption, homestead, or timber culture entry.

Any right under regulation 7 of June 6, 1905 (33 L. D., 607), issued by the Secretary of the Interior under section 10 of the reclamation act, which a successful contestant of a homestead entry on land withdrawn as susceptible of irrigation might have had, was lost by the promulgation of regulation 6 of January 19, 1909 (37 L. D., 365), declaring that where contest has been allowed prior to first form withdrawal if made before the determination of the contest or entry of the successful contestant, will terminate all rights acquired by such contest, where the land before termination of the contest or entry by contestant was withdrawn under the first form for irrigation works, and the contestant had only a preference. (Edwards *v.* Bodkin, 249 Fed., 562.)

PUBLIC NOTICES.

Effect of general public notice of September 24, 1914.—The general public notice of September 24, 1914, was issued purely for the purpose of applying the provisions of the extension act to existing public notices, and is not in any other way to be regarded as an amendment of the public notices then in force. It does not affect the charges nor the class of lands which are subject to former public notices, except as required by the terms of the extension act. (Reclamation Commission Decision, Oct. 6, 1917, in re Benjamin F. Newkirk, Belle Fourche project.)

RECLAMATION FUND.

Building schoolhouse from reclamation fund.—Where a reservoir is being constructed under the reclamation act of June 17, 1902 (32 Stat., 388), upon a site remote from civilization and 30 miles from the nearest school, and it is difficult, without school facilities, to secure a proper supply of efficient labor for the needs of such construction, particularly bosses and skilled workmen with families, and the erection of a school building will aid in securing more men, induce them to remain longer in the service, and be in the interest of the Government, then the cost of such a building may be paid from the reclamation fund. (Comp. Dec., Sept. 24, 1917, in re Rimrock, Yakima project.)

RESIDENCE REQUIREMENTS.

Transfer of land.—Paragraph 105 of the General Reclamation Circular approved May 18, 1916 (45 L. D., 385), provides that in case of the sale of all or any part of the irrigable area of a tract of land in private ownership covered by a water-right application which is not recorded in the county records, the vendor will be required to have his transferee make new water-right application for the land transferred. *Held*, that in making the new application, it is immaterial whether or not the transferee be "an actual bona fide resident on such land or occupant thereof residing in the neighborhood." (Opinion chief counsel, July 25, 1917, in re J. W. Merritt, Truckee-Carson project.)

Suspension of residence requirements during war.—Under sections 11 and 12 of the act of August 10, 1917 (Public No., 40), the Secretary of the Interior will permit as a war measure the acceptance upon Federal reclamation projects during the term of the war as fixed by the act of applications for temporary water delivered to lands in private ownership and subject to public notice without reference to the residence of the water-right applicant. No application, however, will be received under this act from one qualified to make a formal water-right application under section 5 of the reclamation act of June 17, 1902 (32 Stat., 388). The charges for the delivery of water will be the same in amount as the operation and maintenance charges announced by public notice but shall be payable in advance. (Departmental regulations, Oct. 4, 1917).

RIGHTS OF WAY.

Sale of canal easement.—A right-of-way easement for a canal, involving not more than 15 acres of land, acquired by the United States under the reclamation act of June 17, 1902 (32 Stat., 388), comes within the meaning of the word "land" as used in section 1 of the act of February 2, 1911 (36 Stat., 895), and may be sold pursuant to the provisions of that act. (Departmental decision, May 29, 1918. In re Ankeny Canal, Klamath project.)

Right of way for waste and drainage ditches.—The expression "ditches or canals constructed by the authority of the United States" as used in the right-of-way act of August 30, 1890 (26 Stat., 371), includes the necessary waste and drainage ditches upon a Federal reclamation project. (Opinion chief counsel, June 10, 1918, Grand Valley project.)

STATE LANDS.

State lands subject to reclamation law.—Lands of the State of Idaho and of other States having similar laws prior to August 13, 1914, in reference to the Federal reclamation law, are "subject to the terms and conditions of the reclamation law" within the meaning of section 2 of the act of August 13, 1914 (38 Stat., 686). (Departmental decisions, Feb. 8, 1918, and Apr. 1, 1918, overruling departmental decisions, Oct. 17, 1914, and Jan. 14, 1915. See C. L. 745 and C. L. 751.)

State lands in reference to section 9 of the extension act.—Lands owned by the State of South Dakota under its school-land grant do not literally fall within the term "lands in private ownership or lands held under entries not subject to the reclamation law" as used in section 9 of the act of August 13, 1914 (38 Stat., 686). Under the legislation of the State, several conditions must be present before they may be offered for sale, and, further, within irrigation projects of the United States, they can not be sold until the farm units have been established. The State has an important interest in these lands and its interest is entitled to consideration, so that the sale will be in harmony with its laws and made at a time when, under all the circumstances, it will prove beneficial to the fund to be used for common schools, without unnecessary delay to the injury of the reclamation project. The purpose of section 9 was to induce private owners of lands and entrymen promptly to subject their lands to the construction, operation, and maintenance charges, secure a general use of the water, and rapidly place the lands in cultivation to the benefit both of the United States and the water users. The State does not irrigate and cultivate its lands, but disposes of them to private individuals. Such individuals are unable to present any water-right application until the State has offered the lands for sale, and the addition to the construction charge of the penalty under section 9 would penalize the purchaser from the State because the State officers, acting within the discretion conferred upon them by the State law, had not made an earlier sale. Such State lands are also not within the spirit of said section 9, but fall rather in the same category as unentered public lands of the United States. (Departmental decision, May 31, 1918, Benjamin F. Newkirk, Belle Fourche project.)

STATE LAWS.

Application of State laws.—There is nothing in the language of section 8 of the reclamation act of June 17, 1902 (32 Stat., 388), to indicate that the intent of Congress was to go further than to recognize and prevent interference with the laws of the State relating to the appropriation, control, or distribution of water. (San Francisco *v.* Yosemite Power Co., 46 L. D., 96.)

Fishing in Elephant Butte Reservoir.—On July 5, 1917, Hon. Harry L. Patton, attorney general of the State of New Mexico, rendered an opinion in which he holds that, in accordance with sections 2435 and 2470, New Mexico Code, 1915, as amended by sections 7 and 13, chapter 101, Laws, 1915, a State license is required of persons fishing in the Elephant Butte Reservoir, Rio Grande project. In reference to the jurisdiction of the United States he interprets sections 5562 and 5563, of the New Mexico Code, as not applicable to the Elephant Butte Dam, the land involved having been acquired by the United States before the enactment of these sections. He also holds that the reservoir can not be classed as a private lake within the meaning of the New Mexico fish law, as there is open communication between it and the public waters of the State. On August 3, 1917, the chief counsel of the Reclamation Service, in a letter to District Counsel P. W. Dent, held that those who angle in the Elephant Butte Dam for fish protected by the New Mexico law must comply with the State law as to fishing, but the mere fact that a person has a State license does not of itself give that person a right to fish in the reservoir; he must also have the consent of the United States.

WATER-RIGHT APPLICATIONS.

Water-right applications by cities in California.—An incorporated town organized as a city of the sixth class under the laws of the State of California (General Laws, 1909, ch. 7, p. 843) is entitled to make water-right application on the usual form to secure water from a Federal reclamation project for irrigating and beautifying a small tract of land which it owns, located outside the city limits and occupied by the septic tanks of the municipality. (Departmental decision July 13, 1917, Orland project.)

Water-right applications by soldiers.—The status of one qualified to make water-right application under section 5 of the reclamation act of June 17, 1902 (32 Stat., 388), is not changed by a temporary service away from home in the Army, Navy, or Marine Corps of the United States, and a water-right application executed by any such person at any point where he may be engaged in the line of duty may be received and approved if otherwise found acceptable. (Departmental decision, Dec. 22, 1917, C. L., 720.)

WATER-RIGHT CHARGES.

Payment of water charges by mortgagee.—One holding a mortgage against only a part of a tract of land in private ownership upon a Federal reclamation project for which entire tract a water-right application has been made, may pay up from time to time the charges on that portion of the tract covered by the mortgage in the event the landowner fails to pay. (Departmental decision, July 13, 1917.)

Payment of portion of water charges due.—Fiscal agents upon United States reclamation projects are authorized to accept from water users money tendered in payment of an accrued installment of either construction, operation, and maintenance, or rental charges, for any year, even though installments for a previous year remain unpaid,

(Reclamation commission decision, circular letter No. 680, Aug. 6, 1917.)

Payment of water charges when land title is in dispute.—In cases where the title to lands under water-right application upon a Federal reclamation project is in dispute, and the land is in possession of one other than the record owner, the Reclamation Service may deliver water to the party in possession, upon payment in advance of the operation and maintenance charges. (Opinion chief counsel, Aug. 24, 1917, in re Wood *v.* Eggleston, Truckee-Carson project.)

Five per cent increase of construction charges.—The date on which the increase in construction charges, provided by section 9 of the reclamation extension act of August 13, 1914 (38 Stat., 686), first becomes effective is the day next following the expiration of one year after date of approval of the act, or one year after date of public notice, as the case may be. In the former instance the increases accrue on August 14. (Reclamation commission decision, Oct. 18, 1917, C. L. No. 704.)

Suits for water charges.—The provisions of section 5 of the reclamation act of June 17, 1902 (32 Stat., 388), and of sections 3 and 6 of the reclamation extension act of August 13, 1914 (38 Stat., 686), regarding one year of grace for the payment of overdue water charges, refer only to the drastic remedies of cancellation and forfeiture, and not to the right to bring suit in a court for collection of a water charge past due and unpaid. (Opinion chief counsel, Dec. 4, 1917, U. S. *v.* Edison E. Kilgore, Shoshone project.)

Water-right charges in relation to income taxes.—In letter dated February 18, 1918, the United States Commissioner of Internal Revenue holds that payments covering the construction charges on Federal reclamation projects are not allowable deductions in income-tax returns, as the water rights secured by the payment of such charges are perpetual in nature, and the amount so paid should be added to capital investment in order to determine the gain or loss resulting from the transaction upon subsequent disposal of the land and water rights. As to the operation and maintenance charges the commissioner holds them to be an ordinary and necessary expense of doing business, and that the amounts so paid are deductible in the income-tax returns.

Payment of water charges by soldiers and sailors.—Construction charges and operation and maintenance charges upon Federal reclamation projects come within the meaning of the word "assessments" as used in the soldiers' and sailors' civil relief act of March 8, 1918 (Public, No. 103). Under this act a water-right application may be accepted from an entryman in military service who made entry before the passage of the act, without requiring payment of the initial installment of the construction charge at the time of filing the application. (Secretary's regulations, May 29 and June 7, 1918; C. L. 762.)

WATER-USERS' ASSOCIATIONS.

Assessments of water-users' associations.—Where a water-users' association organized for the purpose of guaranteeing payment of the construction cost of a Federal reclamation project, having executed a contract with the United States for that purpose, makes assessments against its members to raise a fund with which to conduct litigation to avoid paying project costs, the United States will not assist the association in collecting such assessments by requiring prospective water users to show as a condition precedent to acceptance of water-right applications that such assessments have been paid. (Departmental decision, May 4, 1918, Boise project.)

LITIGATION.

[Cases initiated in the fiscal year ended June 30, 1918, marked thus: *]

ARIZONA, SALT RIVER PROJECT.

State v. *A. J. Haltom.*—Warrant for criminal trespass, issued May 10, 1915, from court of justice of the peace at Phoenix. Case appealed to superior court. Dismissed.

W. B. Lount and Hattie L. Mosher v. *A. J. Haltom.*—Suit brought May 25, 1915, in superior court for Maricopa County for $1,718.96. Verdict for defendant. Case closed.

W. B. Lount and Hattie L. Mosher v. *Wm. S. Cone, Walter Ward, and Arthur J. Haltom.*—Suit brought in United States district court August 9, 1916, to enjoin alleged overflowing of plaintiff's lands by Salt River Valley Canal, etc., and to recover $10,000 damages. Motion and supplemental answer setting up separation of all defendants from project affairs filed March, 1918. Case pending.

May B. Marley v. *Wm. S. Cone and Arthur J. Haltom.*—Suit brought October 31, 1916, in United States district court for injunction restraining wasting water and to recover $4,500 damages. Defendants' motion to dismiss overruled August 13, 1917, and answer filed September 26, 1917. Case pending.

United States v. *Marion E. Braddock.*—Proceedings brought April 8, 1917, in United States district court to condemn land. Case settled for $5,000.

United States v. *The Packard Investment Company.*—Action brought March 27, 1917, in United States district court for $170.31. Case settled.

ARIZONA-CALIFORNIA, YUMA PROJECT.

Yuma Valley Water Users' Association et al. v. *Schlecht and Fessenden.*—Suit filed June 30, 1917, in United States district court for injunction to restrain Reclamation Service from enforcing construction charge of $75 per irrigable acre. Estimated amount involved $1,902,588. Case pending.

CALIFORNIA, ORLAND PROJECT.

* *United States* v. *H. C. Angle et al.*—Suit brought May 28, 1918, in United States District Court for adjudication of water rights on Stony Creek and tributaries and for injunction. Preliminary injunction granted June 10, 1918, and E. T. Ericksen appointed water commissioner. Case pending.

COLORADO, GRAND VALLEY PROJECT.

In re adjudication water rights, Grand River, District No. 42.—Petition filed November 2, 1908, in State district court. October 4, 1915, Colorado supreme court quashed writ of error without prejudice to United States, on ground that judgment was not final. Orchard Mesa irrigation district intervened to have its rights determined, Decree entered November 5, 1915. On November 6, 1915, motion of United States for new trial denied, written exceptions filed, and leave granted for extension of the record. No further proceedings have been had although status is such that it can be reopened.

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

United States to the use of the Montrose Hardware Company et al. v. *C. D. McPhee et al.* (*United States, intervenor*).—Suit brought September 11, 1905, in State district court. Appeal argued in Supreme Court of Colorado January 17, 1916; decision rendered May 6, 1918; petition for rehearing denied July 1, 1918. Judgment in favor of the individual creditors was affirmed; judgment against the United States in favor of the Colorado sureties, except Orman, was reversed and remanded. The effect of the decision, however, is to subordinate the claims of the United States to those of the individual creditors as the decision permits the individual creditors to collect from the sureties without reference to the claim of the United States. Case pending.

United States v. *Martin Van Horn et al.*—Suit brought April 25, 1912, in the United States district court for an injunction, and on same date temporary restraining order was granted. Temporary injunction issued June 12, 1912, and is still in force. The case is practically closed although the defendants still have the right to ask that the temporary injunction be set aside on final hearing.

U. S. v. *George Lang.*—Suit filed in 1912 in United States district court for the Dallas division of the Northern District of Texas, to recover $7,500 upon bond of Taylor Moore Construction Company in connection with construction of Gunnison Tunnel. Case pending.

U. S. v. *George Schumecker.*—Suit filed in 1912 in United States district court for the Dallas division of the Northern District of Texas, to recover $10,000 upon bond of Taylor Moore Construction Company in connection with construction of Gunnison Tunnel. Case pending.

U. S. v. *A. F. Kirkpatrick.*—Suit filed in 1912 in United States district court for the Dallas division of the Northern District of Texas, to recover $5,000 upon bond of Taylor Moore Construction Company in connection with construction of Gunnison Tunnel. Case pending.

United States v. *Millard Fairlamb et al.*—Suit filed November 27, 1916, in the United States district court to condemn land for right of way. Case pending.

* *United States* v. *Sophronia Thornily et al.*—Suit filed April 23, 1918, in the United States district court to condemn land for right of way. Order granting the United States immediate possession entered May 7, 1918. Case pending.

* *United States* v. *Hi F. Thornily.*—Suit brought April 23, 1918, in the United States district court to enjoin the defendant from interfering with the use by the United States of a right of way under the act of August 30, 1890. Case pending.

IDAHO, BOISE PROJECT.

Farmers' Cooperative Ditch Co. v. *Riverside Irrigation District et al.*—Suit brought in August, 1902, in State district court to adjudicate water rights. Testimony taken in December, 1917. Case pending.

Page and Brinton v. *United States.*—Petition filed February 27, 1912, in Court of Claims for $325,000 damages. Testimony completed. Case pending.

Pioneer Irrigation District v. *American Ditch Co. et al.*—Suit brought July 14, 1913, in State district court for adjudication of water rights. Case pending.

United States v. *American Ditch Co. et al.*—Suit brought October 3, 1913, in United States district court to adjudicate water rights, Boise River. Case pending.

United States v. *Swan Ringwood.*—Suit filed November 8, 1916, in United States district court to condemn land needed for right of way. Damages for $150 awarded July 5, 1918.

H. A. Griffiths et al. v. *Pioneer Irrigation District et al.*—Suit brought December 31, 1916, in State district court to quiet title to alleged water appropriations. December 31, 1917, the court filed an opinion holding that the plaintiff has a valid permit filed in the office of State engineer, but setting out that it does not determine the relative rights of any of the other parties to the suit.

**In re petition of Nampa and Meridian Irrigation District.*—Proceeding brought in State district court for confirmation of apportionment of benefits made by the directors of the district under contract between United States and the district. Tried in December, 1917, and January, 1918. Decision made June 26, 1918, sustaining contentions of the Reclamation Service and confirming the apportionment of benefits made by the directors. Case pending.

**Petrie et al.* v. *Nampa and Meridian Irrigation District.*—Proceeding brought in State district court to confirm the election and other proceedings in connection with a contract between the district and the United States for furnishing water rights and drainage for the lands of the district. Tried in 1915; appeal taken to State supreme court and judgment of the trial court affirmed. (153 Pac., 425.) Appeal taken to United States Supreme Court. Case pending.

**Payette-Boise Water Users' Association* v. *D. W. Cole et al.*—Suit brought April 1, 1918, in State district court to prevent collection of construction charge announced by public notice of July 2, 1917. Case transferred to Federal court and pending.

**J. W. Hannum et al.* v. *D. W. Cole et al.*—Suit brought June 4, 1918, in State district court to compel delivery of water on a rental basis. June 12, 1918, case ordered dismissed by Federal court.

IDAHO, KING HILL PROJECT.

**In re petition of King Hill Irrigation District.*—Case brought in State district court November 5, 1917, for confirmation of proceedings in connection with organization of the district. Decree of confirmation granted.

**In re petition of King Hill Irrigation District.*—Case brought in State district court November 5, 1917, for confirmation of proceedings in connection with election and authorization of contract between King Hill Irrigation District, the United States, and the State of Idaho. Decree of confirmation granted.

IDAHO, MINIDOKA PROJECT.

Brinck, receiver for Monarch & Porter v. *United States.*—Brought in the Court of Claims by the receiver of the firm of Monarch & Porter, the contractors who constructed a portion of the main canal of the

Minidoka project. The suit grows out of a dispute as to the classification of the material excavated under this contract. The amount claimed in the claimants' petition is $122,148. The case was argued before the Court of Claims in the winter of 1917 and 1918, and on February 25, 1918, the Court of Claims rendered a decision fully sustaining the contentions of the Government and allowing the claimant only the amount which had been previously allowed by the Government engineers, the decision being on the ground that the parties had agreed that the decision of the chief engineer of the Reclamation Service as to classification should be final, that no fraud had been shown on the part of the chief engineer, and that therefore the court would not go behind the decision of the chief engineer.

**J. W. Newman* v. *Louis Nelson, Barry Dibble, and F. A. Banks.*—February 1, 1918, J. W. Newman filed suit to enjoin the project manager and his assistant from leasing certain withdrawn public lands on the Minidoka project to the defendant Louis Nelson. The court issued a temporary restraining order and order to show cause returnable on February 11, 1918. Prior to argument of the case plaintiff dismissed the suit and the injunction was dissolved.

MONTANA, BLACKFEET (INDIAN) PROJECT.

George W. Cook and David D. LaBreche v. *United States.*—Suit brought in 1911 in the United States district court for $25,000 damages and for an injunction. Heard before Judge E. C. Rowley, commissioner, on September 21, 1915, and a report and recommendation made for settlement on the basis of $22,950. May 5, 1916, a bill was introduced in the Senate (S. 5912) by Senator Walsh, of Montana, providing for an appropriation of $22,400 from the reclamation fund to be paid plaintiffs for the conveyance of all their lands, property, and rights in connection with their allotments at the foot of Lower Two Medicine Lake. Bill referred to Committee on Indian Affairs. July 31, 1917, the Solicitor for the Department of the Interior held that under section 14 of the act of July 25, 1910 (36 Stat., 855–859), there was ample authority for payment to the claimants of such sum as their allotments were reasonably worth from the fund appropriated for the construction of irrigation works on the Blackfeet Indian Reservation, and claimants were allowed $16,445.07, which was paid, and was accepted by them for all improvements on their land. They returned the patents to their lands and relinquished all right, title, and interest in and to the lands, reserving, however, the right to select lieu allotments if Congress should decline to authorize payment for these lands.

MONTANA, FLATHEAD (INDIAN) PROJECT.

* *United States* v. *W. A. Smith, Gus Cantrell, and Jack Wolf.*—Complaint was made on April 9, 1917, of theft of a load of hay from headquarters camp at St. Ignatius, Mont. The defendants above named were arrested and Smith and Cantrell were indicted by the grand jury. On trial of the case in Missoula in October, 1917, Smith was acquitted and Cantrell convicted.

MONTANA, FORT PECK (INDIAN) PROJECT.

No litigation.

MONTANA, HUNTLEY PROJECT.

No litigation.

MONTANA, MILK RIVER PROJECT.

Measurement and apportionment of waters of Milk and St. Mary Rivers.—Controversy between the United States and Canada arising under the treaty of January 11, 1909, between the United States and Great Britain. The Reclamation Service is concerned because its operations include use of the waters of the two rivers involved. Argued for the service by the chief counsel May 15, 1917, before the International Joint Commission at Detroit, Mich. November 7, 1917, the Secretary of State advised the members of the International Joint Commission that the commission's conclusions so far as they undertook to interpret Article VI of the treaty as to measurement and apportionment of the waters of St. Mary and Milk rivers could not be considered as binding the United States. May 24, 1918, a temporary order of measurement and apportionment, based on present requirements, was made by the commission.

MONTANA, MILK RIVER PROJECT, ST. MARY STORAGE UNIT.

* *United States* v. *Cassidy Swift Current Oil Co., and United States* v. *F. M. Stevenson.*—Hearing was held at Kalispell on May 15, 1917, before the register and receiver of the General Land Office to determine the validity of oil claims of the defendants which conflict with flowage lands of the Sherburne Lakes Reservoir. Decision rendered was not conclusive and was appealed to the department by the oil claimants. Decision was affirmed in part by the commission in May, 1918, and appeal to the department reserved by the Reclamation Service.

MONTANA, SUN RIVER PROJECT.

United States v. *William B. Orser.*—Suit to collect $1,190.80 unpaid water charges filed in the District Court of the United States, District of Montana on August 15, 1916. Judgment was not entered and an amended complaint covering delinquent charges to date ($1,641.02) was filed in June, 1918.

* *United States* v. *William Thomas.*—Suit brought in district court of the United States on August 3, 1917, to collect $20 due for lease of grazing lands. Judgment entered for $20 and costs, $25.85, and payment made September 20, 1917.

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

Pacific Coast Construction Company v. *United States.*—Suit brought May 31, 1911, in Court of Claims to recover $34,852.50. Judgment to claimant for $27,283.37 was awarded on June 10, 1918.

Widell-Finley Co., et al, v. *United States.*—(See South Dakota, Belle Fourche Project.)

United States v. *Charles W. Dick.*—Suit brought May 12, 1916, in the United States district court to recover $1,496, delinquent water-right charges. Dick made partial payment and accepted rental order. Suit dismissed.

* *United States* v. *John C. Reed.*—Suit brought in United States district court in August, 1917, for recovery of $40 for lease of lands. Claim paid and defendant billed for costs amounting to $45, which have not yet been paid.

* *United States* v. *A. F. Nohle.*—Suit brought in January, 1918, in the United States district court to recover $928 delinquent water-right charges. February 1, 1918, Nohle accepted rental order and made payment of delinquent charges and costs; suit dismissed.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

S. R. H. Robinson & Son Contracting Co. v. *United States.*—Suit filed in Court of Claims, November 7, 1913, for $100,531.86, covering excess costs and penalties on forfeited contract completed by United States. Decision June 3, 1918, awarded judgment against United States for $21,275.67, of which $18,562 covered temporary dam and extra work done by United States.

Albert J. Bothwell and Bothwell Co. v. *United States.*—Petition filed in Court of Claims, June 9, 1915, for $125,000, covering damage to hay flooded, loss on pure-bred cattle sold as beef cattle and loss of pure-bred-cattle business, account Pathfinder Reservoir flooding condemned ranch. Amended petition filed February 5, 1916; amendment to amended petition filed May 26, 1916; all evidence taken; case pending.

* *United States* v. *Ramshorn Ditch Co.*—Suit for injunction filed in United States district court, August 21, 1917, to restrain State engineer and Ramshorn Ditch Co. from diverting approximately 40-second-feet of recaptured seepage water. Answer filed February 15, 1918; amended answer filed June 10, 1918; case tried June 10, 1918, at North Platte, Nebr., before Judge Lewis of Colorado; decision not yet handed down.

NEVADA, TRUCKEE-CARSON PROJECT.

The Western Co. v. *The Truckee River General Electric Co. et al.*—Suit brought September 24, 1912, in United States district court to enjoin changing level of Lake Tahoe. Case pending.

United States v. *Orr Water and Ditch Co.*—Suit filed March 3, 1913, in the United States district court for adjudication of water rights on Truckee River and tributaries. Case pending.

John Horstman Co. v. *United States.*—Suit filed in Court of Claims for $35,000 damages. Case pending.

Natron Soda Co. v. *United States.*—Suit filed in Court of Claims for $170,000 damages. Case pending.

State of California v. *Truckee River General Electric Co. et al.*—Suit to determine ownership of State in lands below high-water mark, Lake Tahoe, and for removal of outlet dam. Brought in State court, Placer County, Cal., and removed to United States district court. Case pending.

* *United States* v. *Richard Murphy.*—Suit brought October 8, 1917, in United States district court for injunction to prevent interference with Government structures. Permanent injunction secured. Case closed.

NEW MEXICO, CARLSBAD PROJECT.

United States v. *A., T. & S. F. Ry. Co.*—In United States district court, for condemnation of land. Filed September 11, 1916. Order giving plaintiff possession and appointing commissioners issued September 15, 1916. Case pending, but agreement reached for dismissal of suit. Amount involved indeterminate.

United States v. *Charles A. Bigelow et al.*—Proceedings initiated January 15, 1915, in United States district court, for condemnation of land. Referee's report filed July 2, 1916. Commissioner's report filed February 3, 1917. Order of confirmation, in part, July 27, 1917. Supplemental order requiring payment of interest October 1, 1917. Appeal by United States to circuit court of appeals, March 29, 1918, in matter of interest. Total amount involved, round numbers, $160,000. The 23 appeals listed next below are an outgrowth of this condemnation suit.

* *United States* v. *William E. Rogers et al.*—In United States circuit court of appeals, eighth circuit. Appeal taken March 29, 1918, growing out of United States *v.* Charles A. Bigelow et al., supra. Liability of United States for payment of interest on award in condemnation suit. Amount involved $30,000. Case pending.

* *United States* v. *E. C. Cook et al.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $3,243 returned January 30, 1918. Case pending.

* *United States* v. *Don F. Lyman.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $1,649.25 returned January 30, 1918. Case pending.

* *United States* v. *H. A. Bock.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $2,688.60 returned January 30, 1918. Case pending.

* *United States* v. *H. E. Steadman.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $1,939.95 returned January 30, 1918. Case pending.

* *United States* v. *Margie L. Highsmith.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $16,375.84 returned January 30, 1918. Case pending.

* *United States* v. *C. Bert Smith.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $3,114.57 returned January 30, 1918. Case pending.

* *United States* v. *Herbert Litton.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $1,205 returned January 30, 1918. Case pending.

* *United States* v. *John Fidell.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $440.50 returned January 30, 1918. Case pending.

* *United States* v. *John Carothers et al.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $4,355.75 returned January 30, 1918. Case pending.

* *United States* v. *Mary Fidell.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $1,833.50 returned January 30, 1918. Case pending.

* *United States* v. *Amie D. McHenry.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $8,153.25 returned January 30, 1918. Case pending.

* *United States* v. *W. L. Rogers et al.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $76.65 returned January 30, 1918. Case pending.

* *United States* v. *R. W. Rankin.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $10,821.30 returned January 30, 1918. Case pending.

* *United States* v. *John W. Sanner et al.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $5,231.84 returned January 30, 1918. Case pending.

* *United States* v. *E. H. Vance.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $1,753.15 returned January 30, 1918. Case pending.

* *United States* v. *C. E. Vaughn.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $1,752.30 returned January 30, 1918. Case pending.

* *United States* v. *J. J. Alexander.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $4,979.90 returned January 30, 1918. Case pending.

* *United States* v. *Clara E. Courtney.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $3,844.75 returned January 30, 1918. Case pending.

* *United States* v. *Frank Edwards.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $1,830.72 returned January 30, 1918. Case pending.

* *United States* v. *I. C. Roberts.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $2,548 returned January 30, 1918. Case pending.

* *United States* v. *E. F. Hardwick.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $3,809 returned January 30, 1918. Case pending.

* *United States* v. *Mrs. Marshall K. Holt.*—In United States district court; appeal from award of commissioners in condemnation suit filed May 7, 1917. Tried to jury and verdict for $277.80 returned January 30, 1918. Case pending.

* *United States* v. *H. C. Maynard et al.*—In United States district court. Suit for injunction against unlawful diversion of water to detriment of Carlsbad project, filed July 16, 1917. Temporary restraining order issued July 19, 1917. Case pending. Amount involved indeterminate.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

El Paso Valley Water Users' Association v. *W. H. Austin et al.*—In United States district court. Suit filed April 29, 1912, for adjudication of water rights of Rio Grande in Texas. Case pending.

Oscar C. Snow v. *Francisco Abalos et al.*—In district court of New Mexico (third judicial district). Suit filed October 24, 1912, for adjudication of water rights of Rio Grande in New Mexico. Case pending.

United States v. *A., T. & S. F. Ry. Co.*—In United States district court. Suit filed October 29, 1915, for condemnation of land and other property as right of way. Commissioners appointed January 8, 1916. Report filed September 2, 1916. Case pending on exceptions by plaintiff to report of commissioners. Amount involved indeterminate.

Nellie D. Sperry v. *Chamberino Community Ditch Co. et al.*—In district court of New Mexico, third judicial district. Suit filed March 31, 1916, against employees of Reclamation Service and others seeking injunction against the operation of a certain flume across west side canal account alleged defective construction, and asking for $5,000 damages. Injunction denied. Case still pending on claim for damages.

* *United States* v. *W. F. Payne.*—In United States district court. Suit filed October 13, 1917, for condemnation of land as right of way. Amount involved $326. Commissioners appointed October 17, 1917. Case pending.

* *United States* v. *Elmer C. Beezly.*—In United States district court. Suit filed October 13, 1917, for condemnation of land as right of way. Amount involved $60 and certain legal questions not monetary. Commissioners appointed October 17, 1917. Case pending.

* *El Paso Valley Water Users' Association* v. *Mrs. L. L. Bowen and W. H. Bowen.*—In the forty-first judicial district court, El Paso County, Tex. Suit filed February 4, 1918, to restrain defendants from interfering with United States in constructing drainage ditch over defendants' land under right of way granted in stock subscription contract with association. Temporary injunction granted February 7, 1918. Defendants appealed to Court of Civil Appeals, which, on June 27, 1918, dismissed appeal. Writ of error sued out by defendants June 29, 1918, and case pending in Supreme Court of Texas. Amount involved indeterminate.

NORTH DAKOTA, NORTH DAKOTA PUMPING PROJECT.

No litigation.

OREGON, UMATILLA PROJECT.

In re determination of water rights.—Proceedings begun September 11, 1911, before State water board of Oregon to determine relative rights to the waters of the Umatilla River and tributaries Decree rendered September 9, 1916, by circuit court for Umatilla County. On appeal taken by Western Land & Irrigation Co. decree affirmed November 27, 1917. On rehearing, modified April 16, 1918, by requiring water masters to enforce findings of decree; otherwise decree affirmed.

OREGON-CALIFORNIA, KLAMATH PROJECT.

Klamath Lake Navigation Co. v. *California Northeastern Railroad Company and Southern Pacific Company.*—United States intervened September 30, 1910. Case dismissed.

In re determination water rights, Lost River.—Proceeding before State water board. Case pending.

* *United States* v. *J. P. Harter.*—In United States District Court for California. Action in ejectment. Case pending.

**City of Klamath Falls* v. *Klamath Canal Co., Klamath Water Users, Association, and J. B. Bond.*—In circuit court for Klamath County, Oreg. To recover possession of canal right of way. Case pending.

SOUTH DAKOTA, BELLE FOURCHE PROJECT.

Widell-Finley Co. et al v. *United States.*—Suit filed in Court of Claims, February 9, 1912, for $226,852.02, covering disputed classification material, extra work, etc. All testimony in; case pending.

Belle Fourche Valley Water Users' Association v. *Magruder et al.*—Petition filed in State district court, July 19, 1913, to enjoin Reclamation Service officials from shutting off water, canceling water right, and taking legal action to collect construction charges. Case dismissed August 21, 1917, without prejudice, each side paying its part of costs.

Samuel R. H. Robinson v. *United States.*—Suit filed in Court of Claims, November, 1913, for $17,145.25, damage to contractors' work by Government employees opening sluice gates during flood, extra work, etc. Case pending.

UTAH, STRAWBERRY VALLEY PROJECT.

No litigation.

WASHINGTON, OKANOGAN PROJECT.

Town of Okanogan v. *United States and Calvin Casteel.*—Suit brought in the United States District Court for the Eastern District of Washington for injunction restraining defendants from cutting off water supply from Shull Springs. Suit involves the interpretation of a water contract dated December 3, 1909. Case pending.

WASHINGTON, YAKIMA PROJECT.

Theodore Weisberger v. *United States.*—Suit filed January 22, 1914, in Court of Claims for $91,803.33. Evidence complete and Government's brief filed June 17, 1918. Case pending.

United States v. *West Side Irrigating Co.*—Action brought June 25, 1912, in United States district court for injunction, which was granted February 19, 1916. Appeal taken to circuit court of appeals. Judgment of district court affirmed October 15, 1917 (246 Fed., 212).

United States v. *Oswald S. Thomas.*—Suit filed June 28, 1916, in the United States district court for operation and maintenance charges due under the W. I. Co. water-right contract. Amount, $96.80. Judgment secured.

United States v. *F. L. Watson.*—Suit filed June 28, 1916, in United States district court for operation and maintenance charges under W. I. Co. water-right contract. Amount, $131.53. Judgment secured.

United States v. *William J. Duffy.*—Suit filed on June 28, 1916, in United States district court for operation and maintenance charges under W. I. Co. water-right contract. Amount, $82.60. Judgment secured.

United States v. *Grant McLean.*—Suit filed June 29, 1916, in United States district court for operation and maintenance charges under W. I. Co. water-right contract. Amount, $46.48. Settled.

* *United States* v. *Wm. Gnavauch and Mable Gnavauch.*—Suit brought in United States district court January 30, 1918, to condemn right of way for wagon road. February 6, 1918, case settled by payment of $100. Action dismissed June 15, 1918.

* *United States* v. *Aimee Francis Fear and Joseph H. Freuerbach.*—Suit brought June 12, 1918, in United States district court to condemn lands for canal right of way. Case pending.

WYOMING, JACKSON LAKE ENLARGEMENT.

United States v. *B. D. Sheffield et al.*—On June 20, 1914, suit was filed in the Federal court for the District of Wyoming to condemn lands. The court issued an order giving the United States immediate possession. A special act of Congress passed June 28, 1916 (39 Stat., 1305), provides for settlement of this case without cost to the project by authorizing the conveyance of a small tract of adjacent public land to the defendant in lieu of the private land used for reservoir purposes. Deeds conveying the private land to the United States have been placed in escrow but the completion of the exchange has been delayed on account of certain defects in title which are in process of being cleared up.

WYOMING, SHOSHONE PROJECT.

United States Fidelity & Guaranty Co. v. *United States.*—Suit brought in 1912 in the Court of Claims for the recovery of $822,777.58. Plaintiff's brief filed January 22, 1917. Defendant's brief filed November 13, 1917. Judgment for claimant entered for $322,164.67, March 25, 1918.

PURCHASES OF RIGHTS AND PROPERTY.

The following purchases of rights and property were made during the fiscal year ending June 30, 1918:

Purchases of rights and property.

ARIZONA-CALIFORNIA, YUMA PROJECT.

Vendor.	Description.	Consideration.	Date of contract.
Benson, J. W	Improvements on part of N. ½ NW. ¼ sec. 15, T. 10 S., R. 24 W., G. & S. R. M., for right of way for Yuma Valley drainage ditch.	$56.00	May 18, 1917
Bradley, R. E	Improvements on part of NE. ¼ NW. ¼, sec. 9, T. 10 S., R. 24 W., G. & S. R. M. Right of way for Yuma Valley drainage ditch.	159.80	June 30, 1917
Coe, S. E. and Fred. E	2.24 acres in NW. ¼ sec. 8, T. 9 S., R. 23 W., G. & S. R. M., consisting of two tracts of land, 1.68 and 0.55 acres. Ditch-rider's headquarters.	300.00	....
Garvin, C. A	Improvements on part of N. ½ SW. ¼, sec. 4, T. 10 S. R. 24 W., G. & S. R. M. Right of way for Yuma Valley drainage ditch.	150.75	June 30, 1917
Hodgson, T. J., jr	Improvements on part of SW. ¼ NE. ¼ sec. 29, T. 10 S., R. 24 W., G. & S. R. M. Right of way for Yuma Valley drainage ditch.	154.25	.....do.......
Johnson, Alfred E	Improvements on part of N. ½ NE. ¼ sec. 9, T. 10 S., R. 24 W., G. & S. R. M. Right of way for Yuma Valley drainage ditch.	34.75	.....do.......
Koppeli, J. M	Improvements on part of NW. ¼ NE. ¼ sec. 29, T. 10 S., R. 24 W., G. & S. R. M. Yuma Valley drainage ditch.	305.25	.....do.......
Maxey, J. H	Improvements on part of SE. ¼ sec. 9, T. 10 S., R. 24 W., G. & S. R. M. Yuma Valley drainage ditch right of way.	261.75	.....do.......
Meadows, Jas H. and Gertrude B.	2½ acres in NE. ¼ NE. ¼ of SE. ¼ SW. ¼ sec. 34, T. 8 S., R. 24 W., G. & S. R. M. Ditch rider's headquarters.	375.00	Nov. 19, 1917
Motta, S. F	Improvements on part of S. ½ NE. ¼ sec. 9, T. 10 S., R. 24 W., G. & S. R. M. Right of way for Yuma Valley drainage ditch.	134.10	June 30, 1917
Rygh, Theo. A	Improvements on part of S. ½ SW. ¼ sec. 9, T. 10 S., R. 24 W., G. & S. R. M. Right of way for Yuma Valley drainage ditch.	147.67	Oct. 15, 1917
Sanders, Will H	Improvements on part of SE. ¼ SW. ¼ sec. 4, T. 10 S., R. 24 W., G. & S. R. M. Right of way for drainage ditch.	163.10	Sept. 29, 1917
Schutz, Geo. W	Improvements on part of N. ½ SW. ¼ sec. 9, T. 10 S., R. 24 W., G. & S. R. M. Right of way for Yuma Valley drainage ditch.	....	....
Theilmann, Martha	Improvements on part of NE. ¼ NW ¼ sec. 9, T. 10 S., R. 24 W., G. & S. R. M. Right of way for Yuma Valley drainage ditch.	73.50	June 30, 1917
Trevorrow, W. J	Improvements on part of SE. ¼ sec. 4, T. 10 S., R. 24 W., G. & S. R. M. Right of way for Yuma Valley drainage ditch.	153.51	.....do......
Williams, U. C	Improvements on part of NW. ¼ sec. 4, T. 10 S., R. 24 W., G. & S. R. M. Right of way for Yuma Valley drainage ditch.	229.90	.....do......

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

Vendor.	Description.	Consideration.	Date of contract.
Bruderlin, Elizabeth	0.45 of an acre in SE. ¼ SE. ¼ sec. 30, T. 51 N., R. 10 W., N. M. P. M.	$1.00	Feb. 9, 1916
Cline, A	1.22 acres in W. ½ SW. ¼ sec. 23, T. 15 S., R. 96 W. 6th P. M.	150.00	Sept. 5, 1917
Cook, Earl L	0.60 of an acre in SW. ¼ SE. ¼ NW. ¼ SE. ¼ sec. 34, T. 51 N., R. 11 W., N. M. P. M.	50.00	June 20, 1917
Esser, Martin	2.12 acres in E½ E½ SW. ¼ sec. 34, T. 51 N., R. 11 W., N. M. P. M.	75.00	Oct. 6, 1917
Lace, John J	0.9 of an acre in SW. ¼ NW ¼ sec. 1, T. 50 N., R. 11 W., N. M. P. M.	1.00	Mar. 5, 1917

Purchases of rights and property—Continued.

COLORADO, UNCOMPAHGRE VALLEY PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of contract.
Lutes, S. P	1 acre in NW. ¼ SE. ¼ sec. 3, T. 50 N., R. 11 W., N. M. P. M.	$110.00	May 19, 1917
Pyle, Mrs. Ella A	0.52 of an acre in NW. ¼ NW. ¼ sec. 12, T. 50 N., R. 11 W., N. M. P. M.	1.00	Apr. 3, 1917
Ramage, Henry C	3 tracts aggregating 1.48 acres in SW. ¼ SW. ¼ sec. 1, T. 50 N., R. 11 W., N. M. P. M.	300.00	June 1, 1917
Rhodes, Zachariah M	1.1 acres in SW. ¼ SW. ¼ sec. 36, T. 51 N., R. 11 W., N. M. P. M.	1.00	Mar. 30, 1917
Sewell, Charles P	1.87 acres in E. ½ NW. ¼ sec. 22, T. 51 N., R. 11 W., N. M. P. M.	90.00	May 24, 1917
Scott, Leroy W. and M. B	2 tracts aggregating 3.92 acres in SW. ¼ NE. ¼ and NW. ¼ NE. ¼, sec. 34 and SW. ¼ SE. ¼ sec. 27, T. 51 N., R. 11 W., N. M. P. M.	175.00	Aug. 9, 1917
Sigmund, John	2.52 acres in NW. ¼ NE. ¼, 16 and lot 2 sec. 9, T. 51 N., R. 11 W., N. M. P. M.	66.00	June 19, 1917
Smith, G. M	1.25 acres in NW. ¼ NW. ¼ sec. 1, T. 50 N., R. 11 W., N. M. P. M.	1.00	May 12, 1917
Whitener, C. D	0.54 of an acre in NW. ¼ SW. ¼ sec. 1, T. 50 N., R. 11 W., N. M. P. M.	1.00	Mar. 10, 191
Whiteside, Emma R	1.06 acres in SE. ¼ NE. ¼ sec. 16, T. 51 N., R. 11 W., N. M. P. M.	30.00	Oct. 30, 1917
Woleslagel, J. L	2.91 acres in NE. ¼ SW. ¼ sec. 12, T. 50 N., R. 11 W., N. M. P. M.	175.00	Mar. 28, 1917

Vendor.	Loutsenhizer water rights (amount in second-feet)	Consideration.	Date of deed.
Alvord, Alice Emily	0.1875	$150.00	Sept. 22, 1917
Alexander, James R	.50	400.00	July 30, 1917
Barsch, H. E	.10	80.00	June 3, 1918
Block, Charles A	.25	200.00	July 30, 1917
Chucovich, V. L	.78	624.00	Oct. 27, 1917
Faast, Edmund	.666	533.35	Nov. 30, 1917
Krogh, Anna M	.0625	50.00	May 22, 1918
Neff, Celia A	.078	62.50	July 24, 1917
Perkins, Minnie C. and William F	.50	400.00	Nov. 22, 1917
Rinehimer, A. C. and Cross, Emma C	.25	200.00	July 2, 1917
Rose, C F	1.60	1,280.00	June 8, 1918
Satisfaction Title & Investment Co	.125	100.00	Sept. 21, 1917
Sorensen, Jacob	.0625	50.00	May 18, 1918
Trapp, J. M., and Sada J	.3125	250.00	May 25, 1918

IRONSTONE AND IRONSTONE EXTENSION WATER RIGHTS REPRESENTED BY SHARES OF STOCK

Vendor.	Number of shares.		Consideration	Date of deed.
	Ironstone.	Extension		
Cummings, E. T	2	....	$800.00	Apr. 26, 1918
Meldrum, A. S	2	....	800.00	Apr. 11, 1918
Kelso, Lois I., and Bear, Ethel L	5	....	2,000.00	June 9, 1917
Wilkenson, Frank B., and C. H	1	....	400.00	Feb. 15, 1917

IDAHO, KING HILL PROJECT

Vendor	Description.	Consideration	Date of deed.
Hammett, A. Miller, and Frank T. Wyman.	Lots 1, 2, 3, and 4, block 27; lots 2, 3, 4, 5, 6, and 8, block 2, King Hill townsite.	$485.00	Feb. 5, 1918

Purchases of rights and property—Continued.

IDAHO, MINIDOKA PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Banner, Sam, and Bert Wolfe, and O. G. Pasche.	A strip of land in the SW ¼, sec. 26, T. 10 S., R. 23 E., containing 0.03 acres.	$1.00	July 5, 1917
Ellis, James O	All of lots 11 and 12, blocks 4, original townsite of Paul, Idaho.	1.00	Nov. 24, 1916
Crystal Sand and Gravel Co.	A strip of land in the NE. ¼ SE. ¼, sec. 19, T. 10 S., R. 23 E., containing 0.122 acres.	122.00	Dec. 28, 1914
Hansen, Ernest J	Damage to improvements Farm unit "B", W. ½ NE. ¼ sec. 2, T. 10 S., R. 22 E.	18.50	Feb. 7, 1917
Martin, Oliver O	A strip of land in the W. ½ SW. ¼, sec. 23, T. 9 S., R. 24 E., containing 0.11 acres.	1.00	Dec. 22, 1917
Kashino, Moyemon	A strip of land in the east quarter corner of sec. 3, T. 10 S., R. 24 E., containing ½ acre.	1.00	Feb. 15, 1918

MONTANA, BLACKFEET (INDIAN) PROJECT.

Bear Chief, Cecelia	Relinquishment of following part of her allotment: NE. ¼ SE. ¼, sec. 34, T. 32 N., R 9 W. (40 acres).	$50.00	Nov. 15, 1917
Cook, Geo. W., and LaBreche, David D.	Improvements on lands in lots 3 and 5, sec. 27, and lots 1 and 2, sec. 34, T. 32 N., R. 13 W., M. M.	16,455.07	No contract.
La Mott, Joseph C., and Cecile La Motte	Improvements on SW. ¼ and W. ½, W. ½, SE. ¼, sec. 2 and NE. ¼, SE. ¼, sec. 3, T. 32 N., R. 9 W., M. M.	500.00	Feb. 18, 1918

MONTANA, FLATHEAD (INDIAN) PROJECT.

Vendor.	Description.	Consideration.
Northern Pacific Ry. Co	Land under flow line of Hubbart Reservoir	$3,426.80
Anaconda Copper Mining Co	do	
Heirs of John Fisher, deceased	W. ½ SE. ¼, 8, 16, 19	1,475.00

MONTANA, FORT PECK (INDIAN) PROJECT.

Vendor.	Description.	Consideration.	Date of contract.
Montana, State of	Right of way over State land for telephone line in N. ½ secs. 15, 16, 17, T. 32 N., R. 40 E.		May 14, 1918
Murdock, Rebecca	Right of way over allotment No. 2369 for telephone line in N. ½ sec. 14, T. 32 N., R. 40 E.	$1.00	May 23, 1918

MONTANA, HUNTLEY PROJECT.

Sindelar, Chas., and Anna, his wife.	Improvements on 0.80 acres in W. ½ SW. ¼ SE. ¼ sec. 32, T. 3 N., R. 29 E., M. P. M.	$52.00	Nov. 23, 1917
Egbert, M. L. widow of H. Egbert, deceased.	Improvements on 3.60 acres in lot 4, sec. 32, T. 3 N., R. 29 E., M. P. M.	300.00	Jan. 25, 1918

MONTANA, MILK RIVER PROJECT.

Hunt, Henry, and wife	Tract of land containing 151.92 acres, being lots 7 and 8, sec. 18; lot 11, sec. 17, and NW. ¼ NW. ¼ sec. 20, T. 32 N., R. 33 E., M. P. M.	$2,150.00	Aug. 10, 1917
Lowell, William C.	Tract of land containing approximately 100 acres; the S. ½ N. ½ sec. 15, T. 32 N., R. 32 E., M. P. M.	1,920.00	Aug. 31, 1917

Purchases of rights and property—Continued.

MONTANA, SUN RIVER PROJECT.

Vendor.	Description.	Consideration.	Date of contract.
Flowerree Sheep & Horse Co.	Right of way for wasteway channels from Sun River Slope Canal at Elbow Coulee and Cutting Shed Coulee.	$1.00	Sept. 27, 1917
Teton Land Co.	Right of way for wasteway channel from Sun River Slope Canal through Elbow Coulee.	1.00	Dec. 26, 1917

MONTANA-NORTH DAKOTA, LOWER YELLOWSTONE PROJECT.

Davies, David, and wife	0.22 acres of land in sec. 35, T. 19 N., R. 57 E., M. P. M.	$1.00	Apr. 13, 1918

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

Vendor.	Description.	Consideration.	Date of contract.
Burton, Lillian E., and Sidney Burton.	Improvements on 10.4 acres in SW. ¼ SW. ¼ sec. 17 and SE. ¼ SE. ¼ sec. 18, all in T. 25 N., R. 62 W., 6th P. M.	$200 and fence part of right of way.	Mar. 14, 1918
Dearing, Edward B., and Odessa M. Dearing.	Improvements on 25.4 acres in SW. ¼ sec. 35, T. 23 N., R. 62 W., and N. ½ N. ½ sec. 2, T. 22 N., R. 62 W., 6th P. M.	$1	Nov. 24, 1917
Frederick, Charles, Minnie, Henry, and Stella.	Improvements on 45.1 acres in W. ½ NW. ¼ sec. 18, T. 26 N., R. 64 W. NE. ¼ sec. 14, N. ½ and NE. ¼ SW. ¼ and NW. ¼ SE. ¼ sec. 13, T. 26 N., R. 65 W., 6th P. M.	Cash $1,050, bridge valued at $800, and reconstruct old ditches disturbed.	[1] June 1, 1916
Hain, C. J., and Flora A. Hain.	Improvements on 3 acres in SW. ¼ NW. ¼ sec. 24, T. 23 N., R. 54 W., 6th P. M.	$66	July 15, 1917
Murphy, Wm	Improvements on 21.63 acres in S. ½ SW. ¼ sec. 11 and E. ½ NW. ¼ sec. 14, T. 26 N., R. 65 W., 6th P. M.	$300	[1] Sept. 16, 1913
Nietfeld, Henry, and Jennie Nietfeld.	Improvements on 14 acres in SW. ¼ sec. 30, T. 26 N., R. 64 W., 6th P. M.	Cash $985, bridge valued at $800, two drops, one division box, and reconstruct farm laterals disturbed and 2 flumes.	[1] June 1, 1916
Prentice, A. M	Improvements on 13.4 acres in S. ½ N. ½ sec. 2, T. 22 N., R. 62 W., 6th P. M.	$450	Aug. 21, 1917
Prentice, Warren, and Mary J. Prentice	Improvements on 12.9 acres in NW. ¼ sec. 1, T. 22 N., R. 62 W., 6th P. M.	$387	Do.
Sandercock, Geo. J., and Mollie Sandercock.	Improvements on 30.8 acres in E. ½ SE. ¼ sec. 29, NE. ¼ NE. ¼ sec. 32, and NW. ¼ SW. ¼ sec. 28, T. 26 N., R. 64 W., 6th P. M.	Cash $440, and reconstruct part of old ditch disturbed.	
Sandercock, Hattie A.	Improvements on 10.07 acres in W. ½ SE. ¼ sec. 29, T. 26 N., R. 64 W., 6th P. M.	Cash $1,040, siphon under Fort Laramie Canal, and reconstruct part of old ditch disturbed.	[1] June 1, 1916
Southworth, Alanson, and Rosella Southworth.	Improvements on 11.04 acres in SW. ¼ sec. 10, T. 24 N., R. 62 W., 6th P. M.	150 sacks cement, 2,500 pounds reinforcing steel, and 8,500 feet b. m. of lumber for bridge	Mar. 9, 1918

[1] Contract signed but transaction not completed until fiscal year 1918

Purchases of rights and property—Continued.

NEVADA, TRUCKEE-CARSON PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Beckstead, L. A., and wife	1.74 acres in SE. ¼ NE. ¼ sec. 23, T. 18 N., R. 28 E., M. D. M., for ditch rider's station.	$100.00	May 10, 1918
Oats, John, and wife	Right of way for dam in South Fork of Carson River and flowage easement, all in SW. ¼ NE. ¼ sec. 14, T. 18 N., R. 28 E., M. D. M.	1.00	June 19, 1918
Thornton, J. E., and wife	1.42 acres for canal and drain right of way in SW. ¼ SE. ¼ sec. 14 and NW. ¼ NE. ¼ sec. 23, T. 18 N., R. 28 E., M. D. M.	1.00	July 1, 1918
Wilson, John	1.07 acres in SW. ¼ NE. ¼ sec. 23, T. 18 N., R 28 E., M. D. M., for ditch rider's station.	50.00	May 10, 1918

NEW MEXICO, CARLSBAD PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
	M'MILLAN RESERVOIR.		
Alexander, J. J	80 acres in E. ½ NE. ¼ sec. 12, T. 19 S., R. 26 E., N. M. P. M.; 17.12 acres in SW. ¼ NW. ¼ sec. 7, T. 19 S., R. 27 E., N. M. P. M.; 7.72 acres in NW. ¼ NW. ¼ sec. 7, T. 19 S., R. 27 E., N. M. P. M.	$4,979.90	([1])
Banta, Bryan	2.79 acres in north 28 acres of SE. ¼ NE. ¼ sec. 27, T. 19 S., R. 26 E., N. M. P. M.	195.30	([2])
Bigelow, Charles A	20 acres in E. ½ SE. ¼ SW. ¼ sec. 34, T. 19 S., R. 26 E., N. M. P. M.	1,420.00	([1])
Bock, Henry A	9.47 acres in SW. ¼ SE. ¼ sec. 13, T. 19 S., R. 26 E., N. M. P. M.; 30.90 acres in NW. ¼ SE. ¼ sec. 13, T. 19 S., R. 26 E., N. M. P. M.; 4.44 acres in NE. ¼ SE. ¼ sec. 13, T. 19 S., R. 26 E., N. M. P. M.	2,688.60	([1])
Carothers, et al., John	21.62 acres in SW. ¼ NW. ¼ sec. 26, T. 19 S., R. 26 E., N. M. P. M.; 21 acres in SE. ¼ NW. ¼ sec. 26, T. 19 S., R. 26 E., N. M. P. M.; 10.52 acres in NE. ¼ NW. ¼ sec. 26, T. 19 S., R. 26 E., N. M. P. M.; 25.79 acres in NW. ¼ NE. ¼ sec. 26, T. 19 S., R. 26 E., N. M. P. M.; 31.79 acres in SW. ¼ SE. ¼ sec. 23, T. 19 S., R. 26 E., N. M. P. M.; 13.73 acres in SE. ¼ SW. ¼ sec. 23, T. 19 S., R. 26 E., N. M. P. M.	4,355.75	([1])
Cook, E. C	14.45 acres in NW. ¼ NE. ¼ sec. 34, T. 19 S., R. 26 E., N. M. P. M.; 0.40 acre in SW. ¼ SE. ¼ sec. 27, T. 19 S., R. 26 E., N. M. P. M.; 3.30 acres in NE. ¼ NE. ¼ sec. 34, T. 19 S., R. 26 E., N. M. P. M.; 25.49 acres in SE. ¼ SE. ¼ sec. 27, T. 19 S., R. 26 E., N. M. P. M.	3,243.00	([1])
Courtney, Clara E	14.76 acres in SW. ¼ NE. ¼ sec. 12, T. 19 S., R. 26 E., N. M. P. M.; 20.99 acres in NW. ¼ NE. ¼ sec. 12, T. 19 S., R. 26 E., N. M. P. M.; 35.81 acres in SW. ¼ SE. ¼ sec. 1, T. 19 S., R., 26 E., N. M. P. M.; 38.29 acres in NW. ¼ SE. ¼ sec. 1, T. 19 S., R. 26 E., N. M. P. M.	3,844.75	([1])
Detling, J. G	1.76 acres in NW. ¼ SE. ¼ sec. 6, T. 19 S., R. 27 E., N. M. P. M.	17.60	([2])
Edwards, Frank	39.86 acres in SW. ¼ NE. ¼ sec. 1, T. 19 S., R. 26 E., N. M. P. M.; 36.42 acres in SE. ¼ NW. ¼ sec. 1, T. 19 S., R. 26 E., N M. P. M.	1,830.72	([1])
Fidell, John	0.04 acre in NE. ¼ SW. ¼ sec. 26, T. 19 S., R. 26 E., N. M. P. M.; 1.70 acres in SW. ¼ NE. ¼ sec. 26, T. 19 S., R. 26 E., N. M. P. M.; 7.07 acres in NE ¼ NE. ¼ sec. 26, T. 19 S., R. 26 E., N. M. P. M.	440.50	([1])
Fidell, Mary	21.51 acres in SE. ¼ SE. ¼ sec. 23, T. 19 S., R. 26 E., N. M. P. M.; 15.16 acres in SW. ¼ NW. ¼ sec. 24, T. 19 S., R. 26, E., N. M. P. M.	1,833.50	([1])
Hardwick, E. F	40.09 acres in SW. ¼ SW. ¼ sec. 30, T. 19 S., R. 27 E., N. M. P. M.; 33.42 acres in NW. ¼ SW. ¼ sec. 30, T. 18 S., R. 27 E., N. M. P. M.; 0.24 acres in SW. ¼ NW. ¼ sec. 30, T. 18 S., R. 27 E., N. M. P. M.	3,809.00	([1])
Highsmith, Margie L	314.92 acre in E. ½ NE. ¼ sec. 1, T. 19 S., R. 26 E., N. M. P. M.; N. ½ NW. ¼ sec. 6, T. 19 S., R. 27 E., N. M. P. M.; S. ½ SW. ¼ NW. ¼ SW. ¼, SW. ¼, NW. ¼ sec. 31, T. 18 S., R. 27 E., N. M. P. M.	16,375.84	([2])
Holt, Mrs. Marshall K	13.89 acres in SE. ¼ NW. ¼ sec. 30, T. 18 S., R. 27 E., N. M. P. M.	277.80	([1])

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[1] In the United States District Court for District of New Mexico, orders of court dated Jan. 30, 1918, amended Feb. 16, 1918.

[2] Order of conrt dated July 27, 1917.

Purchases of rights and property—Continued.

NEW MEXICO, CARLSBAD PROJECT—Continued.

Vendor.	Description	Consideration.	Date of deed.
	M'MILLAN RESERVOIR—continued.		
Kaiser, Arthur A.	80 acres in W. ½ SW. ¼ sec. 29, T. 18S., R. 27 E., N. M. P. M.; 39.57 acres in NW. ¼ NW. ¼ sec. 32, T. 18 S., R. 27 E., N. M. P. M.; 16.46 acres in SW. ¼ NW. ¼ sec. 29, T. 18 S., R. 27 E., N. M. P. M.	$3,060.68	(1)
Litton, Herbert	0.60 acre in SW. ¼ SW. ¼ sec. 26, T. 19 S., R. 26 E., N. M. P. M.; 0.33 acre in NW. ¼ SW. ¼ sec. 26, T. 19 S., R. 26 E., N. M. P. M.; 1.37 acres in NW. ¼ SW. ¼ sec. 26, T. 19 S., R. 26 E., N. M. P. M.; 0.11 acre in NW. ¼ SW. ¼ sec. 26, T. 19 S., R. 26 E., N. M. P. M.	1,205.00	(1)
Lyman, Don F	5.22 acres in NW. ¼ NE. ¼ sec. 23, T. 19 S., R. 26 E., N. M. P. M.; 34.40 acres in NE. ¼ NE. ¼ sec. 23, T. 19 S., R. 26 E., N. M. P. M.; 4.36 acres in SE. ¼ SE. ¼ sec. 14, T. 19 S., R. 26 E., N. M. P. M.	1,649.25	(1)
McCrillis, Mary Z.	2.64 acres in SE. ¼ NE. ¼ sec. 2, T. 19 S., R. 26 E., N. M. P. M.	79.20	(2)
McHenry, A.D. (A. B.)	40 acres in NW. ¼ SE. ¼ sec. 23, T. 19 S., R. 26 E., N. M. P. M.; 8.61 acres in NE. ¼ SE. ¼ sec. 23, T. 19 S., R. 26 E., N. M. P. M.; 34.45 acres in SE. ¼ NE. ¼ sec. 23, T. 19 S., R. 26 E., N. M. P. M.; 25.65 acres in SW. ¼ NE. ¼ sec. 23, T. 19 S., R. 26 E., N. M. P. M.	8,153.25	(1)
Miles S. F	19.75 acres in NE. ¼ SE. ¼ sec. 27, T. 19 S., R. 26 E., N. M. P. M.	553.00	(2)
Rogers, William E	21.16 acres in NW. ¼ SW. ¼, sec. 1, T. 19 S., R. 26 E., N. M. P. M.; 32.05 acres in SW. ¼ NW. ¼ sec. 1, T. 19 S., R. 26 E., N. M. P. M.; 0.80 acre in NW. ¼ NW. ¼, S. 1, T. 19 S., R. 26 E., N. M. P. M.	1,512.00	(2)
Rogers, William L	2.19 acres in SE. ¼ NW. ¼ sec. 24, T. 19 S., R. 26 E., N. M. P. M.	76.65	(1)
Rankin, R. W	40 acres in NW. ¼ NW. ¼ sec. 24, T. 19, S., R. 26 E., N. M. P. M.; 37.61 acres in NE. ¼ NW. ¼ sec. 24, T. 19, S., R. 26 E., N. M. P. M.; 5.20 acres in NW. ¼ NE. ¼ sec. 24, T. 19 S., R. 26 E., N. M. P. M.; 10.80 acres in SW. ¼ SW. ¼ sec. 13, T. 19 S., R. 26 E., N. M. P. M.; 37.54 acres in SE. ¼ SW. ¼ sec. 13, T. 19 S., R. 26 E., N. M. P. M.; 23.44 acres in NE. ¼ SW. ¼ sec. 13, T. 19 S., R. 26 E., N. M. P. M.	10,821.30	(1)
Roberts, I. C	40.29 acres in NW. ¼ NE. ¼ sec. 1, T. 19 S., R. 26 E., N. M. P. M.; 32.51 acres in NE. ¼ NW. ¼ sec. 1, T. 19 S., R. 26 E., N. M. P. M.	2,548.00	(1)
Sanner & Clark	18.45 acres in SW. ¼ NE. ¼ sec. 13, T. 19 S., R. 26 E., N. M. P. M.; 36.02 acres in SE. ¼ NE. ¼ sec. 13, T. 19 S., R. 26 E., N. M. P. M.; 14.37 acres in NE. ¼ NE. ¼ sec. 13, T. 19 S., R. 26 E., N. M. P. M.	5,231.84	(1)
Smith, C. Bert	0.25 acre in SW. ¼ SW. ¼ sec. 6, T. 19 S., R. 27 E., N. M. P. M.; 36.16 acres in SE. ¼ SE. ¼ sec. 1, T. 19 S., R. 26 E., N. M. P. M.; 29.16 acres in NE. ¼ SE. ¼ sec. 1, T. 19 S., R. 26 E., N. M. P. M.	3,114.57	(1)
Schripps, G. H	19.93 acres in SE. ¼ SE. ¼ sec. 25, T. 18 S., R. 26 E., N. M. P. M.; 1.67 acres in SW. ¼ SE. ¼ sec. 25, T. 18 S., R. 26 E., N. M. P. M.; 1.72 acres in NE. ¼ SE. ¼ sec. 25, T. 18 S., R. 26 E., N. M. P. M.	233.20	(2)
Short & Wilson	27.49 acres in SW. ¼ SE. ¼ sec. 34, T. 19 S., R. 26 E., N. M. P. M.; 32.64 acres in NW. ¼ SE. ¼ sec. 34, T. 19 S., R. 26 E., N. M. P. M.; 32.15 acres in SW. ¼ NE. ¼ sec. 34, T. 19 S., R. 26 E., N. M. P. M.	3,563.00	(2)
Steadman, Herbert E	1.06 acres in SE. ¼ SE. ¼ sec. 12, T. 19 S., R. 26 E., N. M. P. M.; 36.45 acres in NE. ¼ SE. ¼ sec. 12, T. 19 S., R. 26 E., N. M. P. M.; 5.60 acres in NW. ¼ SE. ¼ sec. 12, T. 19 S., R. 26 E., N. M. P. M.	1,939.95	(1)
Upham, George N	3.44 acres in south, 12 acres of SE. ¼ NE. ¼ sec. 27, T. 19 S., R. 26 E., N. M. P. M.	68.88	(2)
Vance, E. H	23.59 acres in SW. ¼ SW. ¼ sec. 7, T. 19 S., R. 27 E., N. M. P. M.; 26.50 acres in NW. ¼ NW. ¼ sec. 18, T. 19 S., R. 27 E., N. M. P. M.	1,753.15	(1)

[1] In the United States District Court for District of New Mexico, orders of court dated Jan. 30, 1918, amended Feb. 16, 1918.

[2] Order of court dated July 27, 1917.

Purchases of rights and property—Continued.

NEW MEXICO, CARLSBAD PROJECT—Continued.

Vendor.	Description.	Consideration	Date of deed.
	M'MILLAN RESERVOIR—continued.		
Vaughn, C. E	37.91 acres in NW. ¼ SW. ¼ sec. 7, T. 19 S., R. 27 E., N. M. P. M.; 20.50 acres in NE. ¼ SW. ¼ sec. 7, T. 19 S., R. 27 E., N. M. P. M.	$1,752.30	(1)
Yoh, Curtis	7.69 acres in SW. ¼ SE. ¼ sec. 7, T. 19 S., R. 27 E., N. M. P. M.; 3.02 acres in NW. ¼ SE. ¼ sec. 7, T. 19 S , R. 27 E., N. M. P. M.	299.88	(2)
Zajic, Henry	0.95 acre in SE. ¼ NW. ¼ sec. 13, T. 19 S., R. 26 E., N. M. P. M.	35.00	(2)
Total, McMillan Reservoir, 1,990.29 acres.		92,962.36	
	DRAIN D.		
McRae, J. A., and Lucile	Damage to crops by drain ditch	30.00	June 25, 1917
Moore, W. A	do	20.00	Sept. 8, 1917

NEW MEXICO-TEXAS, RIO GRANDE PROJECT.

Alarcon, Julian	W. ½ sec. 18, T. 33 S. R. 8 E., N. M. P. M., U. S. R. S. survey San Elizario Grant, Texas, 2.8 acres.	$1.00	Oct. 10, 1917
Abraham, N	Donation of land in W. ½ sec. 24, T. 28 S., R. 3 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Mar. 22, 1918
Alderete, F. G	Donation of land in SE. ¼ sec. 11 and SW. ¼ sec. 12, T. 32 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Mar. 12, 1918
Adams, Cesaria J	Purchase of land in SW. ¼ SW. ¼ sec. 19, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	133.00	May 27, 1918
Barada, J. G	Sec. 11, T. 27 S., R. 3 E., N. M. P. M., 4.8 acres	1.00	(3)
Benson, P. N	W. ½ NW. ¼ sec. 26, and NE. ¼ NE. ¼ sec. 27, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Ysleta Grant, Texas, 1.29 acres.	1.00	Dec. 26, 1917
Booker, L. E., et ux	S. ½ SW. ¼ sec. 32, T. 33 S., R. 8 E., N. M. P. M., U. S. R. S. survey, San Elizario Grant, Texas, 2.4 acres.	1.00	Sept. 11, 1917
Bradt, J. N., et ux	SW. ¼ NE. ¼ sec. 31, T. 33 S., R. 8 E., N. M. P. M., U. S. R. S. survey, 0.33 acre.	1.00	Aug. 2, 1917
Barreras, Eulogio	Purchase of land in SE. ¼ SW. ¼ sec. 19, T. 26 S., R. 3 E., N. M. P. M., New Mexico.	258.30	Jan. 5, 1918
Bowington, Elizabeth	Purchase of land in SE. ¼ SE. ¼ sec. 26, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Jan. 11, 1918
Bassett, C. N	Donation of land in secs. 12 and 13, T. 32 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Jan. 25, 1918
Bouvet, Martin F	Purchase of improvements on land in S. ½ sec. 5, T. 18 S., R. 4 W., N. M. P. M., New Mexico.	176.71	May 25, 1918
Burrus, Louis, et ux	Purchase of land in NE. ¼ sec. 6, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	327.00	June 11, 1918
Cantrell, W. B., et ux	SE. ¼ SE. ¼ sec. 24, T. 17 S., R. 5 W., N. M. P. M., 3.1 acres.	450.00	Nov. 7, 1917
Candelaria, Santos	N. ½ NW. ¼ sec. 19, T. 26 S., R. 3 E., N. M. P. M., 2.12 acres.	1.00	Nov. 26, 1917
Celum, John, et ux	SW. ¼ sec. 1, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, 5 acres.	1.00	Nov. 28, 1917
Candelaria, Clemente, et ux	Donation of land in NE. ¼ SE. ¼ sec. 36, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Feb. 28, 1918
Clements, Carrie, et vir	Donation of land in NW. ¼ sec. 36, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Feb. 21, 1918
Candelaria, Jesus	Donation and purchase of improvements on land in W. ½ SW. ¼ sec. 31, T. 31 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	19.20	Apr. 12, 1918
Cooley and Peyton	Purchase of land in SW. ¼ sec. 13 and SE. ¼ NE. ¼ sec. 14, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1,054.00	Do.
Cathcart, D. W	Purchase of land in SW. ¼ SE. ¼ sec. 11, and NW. ¼ NE. ¼ sec. 14, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	173.55	Apr. 16, 1918
Case, Fred S., et ux	Land in SW. ¼ SW. ¼ sec. 18 and NW. ¼ NW. ¼ sec. 19, T. 26 S., R. 3 E., N. M. P. M., New Mexico.	135.00	Apr. 9, 1918
Clapp, Lafayette, et ux	Donation of land in SW. ¼ NE. ¼ sec. 2, T. 19 S., R. 4 W., N. M. P. M. New Mexico.	1.00	Jan. 23, 1918

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[1] In the United States District Court for District of New Mexico, orders of court dated Jan. 30, 1918, amended Feb. 16, 1918.

[2] Order of court dated Jnly 27, 1917.

[3] Deed signed July 1, 1917; contract July 14, 1916.

Purchases of rights and property—Continued.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Coker, G. M., et ux	Purchase of land in SE. ¼ NW. ¼ sec. 22, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	$165.00	Apr. 27, 1918
Canutillo Townsite & Land Co.	Donation of land in NW. ¼ NW. ¼ sec. 23, and W. ½ sec. 24, T. 28 S., R. 3 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Jan. 11, 1918
Coffin, C. O	Donation of land in NW. ¼ NW. ¼ sec. 22, and SW. ¼ SW. ¼ sec. 15, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Apr. 22, 1918
Do	Donation of land in NE. ¼ SE. ¼ and S. ½ NE. ¼ sec. 16, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Do.
Do	Donation of land in E. ½ NE. ¼ sec. 27 and SW. ¼ NW. ¼ sec. 26, T. 32 S., R. 7 E., N. M. P. M, U. S. R. S. survey, Texas.	1.00	Do.
Cathcart, J. W	Donation of land in SE. ¼ sec. 10 and SW. ¼ sec. 11, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S survey, Texas.	1.00	Do.
Candelaria, Jesus	Donation of land in W. ½ SW. ¼ sec. 31, T. 31 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Apr. 9, 1918.
Crawford, L. M., trustee	NE. ¼ NW. ¼ sec. 35, and W. ½ sec. 26, T. 28 S., R. 3 E., N. M. P. M., 14.94 acres.	1.00	Sept. 10, 1917
Chamberino Community Ditch.	Part of ditch right of way	1.00	Sept. 25, 1917
Clint Community Ditch	Entire ditch system	1.00	Dec. 31, 1917
Celum, John, et ux	Donation of land in SW. ¼ sec. 1, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Jan. 26, 1918
Celum, A. T., et ux	Purchase of land in NE. ¼ sec. 2, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	380.00	Feb. 12, 1918
Canutillo Townsite & Land Co.	Donation of land in secs. 13, 14, and 24, T. 28 S., R. 3 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Mar. 20, 1918
Candelaria, Clemente	Purchase of improvements on land in NE. ¼ SE. ¼ sec. 36, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	26.80	Feb. 28, 1918
Celum, John, et ux	Purchase of improvements on land in SW. ¼ sec. 1, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	357.00	Feb. 27, 1918
City National Bank	Purchase of improvements on land in secs. 1 and 12, T. 26 S., R. 2 E., N. M. P. M., New Mexico. Structures valued at.	750.00	May 10, 1918
Davy, E. J	Purchase of improvements on land in N. ½ sec. 7, T. 19 S., R. 3 W., N. M. P. M., New Mexico.	208.25	Mar. 30, 1918
Davis, Chas., et ux	Donation of land in SE. ¼ sec. 26 and NW. ¼ sec. 36, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Feb. 28, 1918
Davis, Chas	Donation of land in N. ½ sec. 6, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Feb. 28, 1918
Dickerson, John	Land in secs. 7 and 8, T. 19 S., R. 3 W., N. M. P. M., New Mexico.	237.50	Mar. 29, 1918
Dunne, Joe	Purchase of land in SW. ¼ and NE. ¼ sec. 22, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	128.00	May 31, 1918
Davy, E. J., et ux	Donation of land in NW. ¼ NE. ¼ sec. 7, T. 19 S., R. 3 W., N. M. P. M., New Mexico Co.	1.00	Mar. 24, 1918
Elephant Butte Land Co	SE. ¼ SW. ¼ sec. 1, T. 17 S., R. 5 W., N. M. P. M., tract No. 1, 4.46 acres.	242.22	Nov. 5, 1917
Do	Tract No. 2, N. ½ SW. ¼ sec. 13, T. 17 S., R. 5 W., N. M. P. M., 4.51 acres.	244.93	Do.
Do	Tract No. 3, SE. ¼ SW. ¼ and SW. ¼ SE. ¼ sec. 24, T. 17 S., R. 5 W., N. M. P. M., 9.24 acres.	501.82	Do.
Do	Tract No. 4, E. ½ NE. ¼ sec. 23, T. 17 S., R. 5 W., N. M. P. M., 8.07 acres.	438.28	Do.
Do	Tract No. 5, SW. ¼ NW. ¼ sec. 13, T. 17 S., R. 5 W., N. M. P. M., 2.97 acres.	241.68	Do.
Eubank, J. W	Purchase of land in NW. ¼ SE. ¼ sec. 3, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S., survey, Texas.	200.00	May 31, 1918
Fink, W. N., et ux	SE. ¼ SW. ¼ sec. 30 and NE. ¼ NW. ¼ sec. 31, T. 33 S., R. 8 E., N. M. P. M., U. S. R. S. survey, Texas, 1.38 acres.	1.00	Aug. 29. 1917
Freudenthal, Morris, et ux	NE. sec. 32 and SE. ¼ sec. 29, T. 25 S., R. 3 E., N. M. P. M., New Mexico, 15 acres.	1.00	Nov. 26, 1917
Frazer, Mattie, et vir	Purchase of land in SW. ¼ NE. ¼ and NW. ¼ SE. ¼ sec. 22, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	647.00	Jan. 12, 1918
Fitzpatrick, Alice	Purchase of land in W. ½ sec. 36, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	135.00	Mar. 19, 1918
Guerra, T	Sec. 11, T. 32 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Ysleta grant, Texas, 0.876 acres.	66.00	Nov. 17, 1917
Garcia, J. B	W. ½ NW. ¼ sec. 18, T. 33 S., R. 8 E., N. M. P. M., U. S. R. S. survey, Texas, 2.27 acres.	1.00	Oct. 10, 1917

Purchases of rights and property—Continued.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Graves, Mattie P., et vir	Purchase of improvements on land in N. ½ sec. 26, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	$21.50	Jan. 25, 1918
Gaal, I. G., et al	Purchase of land in S. ½ sec. 11, T. 32 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	400.00	Feb. 7, 1918
Graves, Mattie P., et vir	Donations of land in N. ½ sec. 26, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Jan. 24, 1918
Guerra, J. R	Donation of land in SE. ¼ SE. ¼ sec. 26, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Jan. 11, 1918
Gameochipi, Fernando	Purchase of improvements on land in NW. ¼ sec. 6, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	49.80	Feb. 23, 1918
Do	Donation of land in NW. ¼ sec. 6, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Feb. 21, 1918
Ciron, Tomasa G	Donation of land in SW. ¼ sec. 16, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Apr. 11, 1918
Hatch Community ditch	....	1.00	Nov. 2, 1917
Happer, John A	Donation of land in W. ½ sec. 19, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Apr. 12, 1918
Hale, Angela	Donation of land in secs. 24 and 25, T. 28 S., R 3 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Mar 26, 1918
Harris, W. J., et ux	Donation of land in SW. ¼ NW. ¼ sec. 26, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Apr. 8, 1918
Do	Donation of land in SW. ¼ SW. ¼ sec. 31, T. 31 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Feb. 18, 1918
Jensen, Thos., et ux	Purchase of land in secs. 19 and 30, T. 26 S., R 3 E., N. M. P. M., New Mexico.	126.50	Jan. 2, 1918
Jensen, Allie, et vir	Purchase of land in W. ½ sec. 19, T. 26 S., R. 3 E., N. M. P. M., New Mexico.	310.00	Jan. 24, 1918
Kerbey, M. M	Survey 259, S. A. M. G. Ry. Co. survey, T. 28 S., R. 3 E., N. M. P. M., Texas, 8.75 acres.	1.00	Aug. 4, 1917
Kohlberg, Bertha, et vir	NE. ¼ sec. 29 and NW. ¼ sec. 28, T. 26 S., R. 3 E., N. M. P. M., 7.87 acres.	1.00	Sept. 6, 1917
King, Chas. A., et ux	Purchase of improvements on land in SE. ¼ SW. ¼ sec. 15, and N. ½ sec. 22, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	52.00	Jan. 12, 1918
Krakauer, A	Purchase of land in NE. ¼ sec. 24, and S. ½ sec. 13, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1,084.00	Mar. 14, 1918
Do	Purchase of improvements on land in SW. ¼ sec. 18 and NE. ¼ NW. ¼ sec. 19, T. 33 S., R. 8 E., N. M. P. M., U. S. R. S., survey, Texas.	813.00	Mar. 13, 1918
Knox, J. F., et ux	Purchase of land in NE. ¼ sec. 2, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	570.00	Apr 15, 1918
Kelly, Thos., et ux	Donation of land in W. ½ SW. ¼ sec. 18, T. 26 S., R. 3 E., N. M. P. M., New Mexico.	1.00	May 10, 1918
Do	Donation of land in W. ½ SW. ¼ sec. 13, T. 26 S., R. 3 E., N. M. P. M., New Mexico.	1.00	Jan. 22, 1918
King, Chas. A., et ux	Donation of land in SE. ¼ SW. ¼ sec. 15 and N. ½ sec. 22, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Jan. 2, 1918
Loewenstein, Isaac	Purchase of improvements on lands in NE. ¼ sec. 36, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	25.80	Feb. 26, 1918
Lange, Edward	Donation of land in NW. ¼ sec. 19, T. 26 S., R. 3 E., N. M. P. M., New Mexico.	1.00	Jan. 2, 1918
Love, M. E	Purchase of land in N. ½ sec. 6, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	135.00	Apr. 1, 1918
Lang, E. H	Donation of land in NW. ¼ NW. ¼ sec. 6, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Mar. 1, 1918
Loewenstein, Isaac	Donation of land in NE. ¼ SE. ¼ sec. 36, T. 31, S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Feb. 26, 1918
Loewenstein, Juana, et ux	Purchase of land in S. ½ sec. 36, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	255.60	Feb. 25, 1918
Link, Edmondson B., et ux	S. ½ SW. ¼ sec. 2, T. 25 S., R. 2 E., N. M. P. M., 0.33 acre.	25.00	Sept 22, 1917
Loomis Farm Co	NW. ¼ sec. 29, SW. ¼ sec. 20 and SE. ¼ sec. 19, T. 33 S., R. 8 E., N. M. P. M., 6.5 acres NE. ¼ and NE. ¼ NW. ¼ sec. 19, T. 33 S., R. 8 E., N. M. P. M., U. S. R. S. survey, Texas., 6.83 acres.	602.15	Nov. 15, 1917
Lassich, Antonio	Purchase of land in W. ½ sec. 19, T. 26 S., R. 3 E., N. M. P. M., New Mexico.	489.60	Jan. 5, 1918
Loomis, Chas, R., et ux	Purchase of land in E. ½ sec. 35, T. 33 S., R. 7 E. and W. ½ sec. 30, T. 33 S., R. 8 E., N. M. P. M., U. S. R. S. survey, Texas.	1,000.00	Feb. 9, 1918
Lang, E. H	Purchase of improvements on land in NW. ¼ NW. ¼ sec. 6, T. 32 S., R. 7 E. N. M. P. M., U. S. R. S. survey, Texas.	31.10	Mar. 1, 1918
Martinez, Albino	SE. ¼ NW. ¼ and NE. ¼ SW. ¼ sec. 4, T. 25 S., R. 2 E., N. M. P. M., 1.64 acres.	166.20	Aug. 10, 1017

Purchases of rights and property—Continued.

NEW MEXICO-TEXAS, RIO GRANDE PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Martinez, Petra	Sec. 2, T. 25 S., R. 8 E., N. M. P. M., 0.96 acre	$100.00	Aug. 10, 1917
Miller, W. E., and A. Goldstein.	Donation of land in Secs. 11 and 12 T., 32 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Feb. 5, 1918
McKamy, Fred J., et ux	Donation of land in NE. ¼ SE. ¼ sec. 35, T. 26 S., R. 3 E., N. M. P. M., U. S. R. S., survey, Texas.	1.00	Jan. 11, 1918
Mitchell, Jas. P., et ux	Donation of land in S. ½ Sec. 34, T. 18 S., R. 4 W., N. M. P. M., New Mexico.	1.00	Dec. 31, 1917
Oden, Laura	Purchase of land in secs. 22, 26 and 27, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	274.18	April 13, 1918
Pomeroy, Chas. L	Purchase of land in E. ½ SE. ¼ sec. 26, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	140.00	Jan. 5, 1918
Palmer, Wm., jr	Purchase of improvements on land in NE. ¼ sec. 20, T. 18 S., R. 4 W., N. M. P. M., New Mexico.	142.30	Jan. 24, 1918
Pitts, Henry S., et ux	Donation of land in NW. ¼ NW. ¼ sec. 23, T. 28 S., R. 3 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Jan 25, 1918
Palmer, Wm., jr	Donation of land in NE. ¼ NE. ¼ sec. 3, T. 19 S., R. 4 W., N. M. P. M., Mew Mexico.	1.00	Jan. 24, 1918
Pendell and Christie	Donation of land in NW. ¼ SE. ¼ sec. 26, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Apr. 8, 1918
Provencio, Jose M., et ux	Purchase of land in NE. ¼ NW. ¼ sec. 22, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	May 20, 1918
Rodriguez, E. E., et ux	Purchase of land in SE. ¼ SE. ¼ sec. 4, T. 25 S., R. 2 E., N. M. P. M., 19 acres.	200.00	Dec. 17, 1917
Rodela, Refugio, et ux	Purchase of improvements on land in NW. ¼ SE. ¼ sec. 36, T. 31 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	26.40	Feb. 28, 1918
Ruiz, Herminio	Donation of land in SE. ¼ NE. ¼ sec. 25, T. 33 S., R. 7 E., and SW. ¼ NW. ¼ sec. 30, T. 33 S., R. 8 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Feb 21, 1918
Rodela, Refugio, et ux	Donation of land in NW. ¼ SE. ¼ sec. 36, T. 31 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Feb 28, 1918
Ridley, John M	Donation of land in S. ½ NE. ¼ sec. 16, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Apr. 17, 1918
Rogers, Thos. R	Donation of land in NW. ¼ sec. 13, T. 32 S., R. 6 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Apr. 23, 1918
San Miguel Community ditch	Entire ditch system	1.00	Dec. 8, 1917
Socorro Community Ditch	Entire ditch system	1.00	Dec. 24, 1917
Skov, W. P., et ux	Donation of land in S. ½ SE. ¼ sec. 28, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Mar. 13, 1918
Silva, Jos., et ux	Donation of land in SE. ¼ sec. 35, T. 32 S., R. 7 E., and NE. ¼ sec. 2, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Apr. 11, 1918
Stewart, Mary F	Donation of land in E. ½ sec. 14, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Mar. 30, 1918
Tooley, Honto H	Purchase of land in SE. ¼ sec. 11 and NE. ¼ sec. 14, T. 28 S., R. 3 E., N. M. P. M., U. S. R. S. survey, Texas.	1,236.00	Feb. 22, 1918
Thompson, L. R., et ux	Donation of land in SW. ¼ sec. 26, T. 32 S., R 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Apr. 11, 1918
Telles, Julian	Purchase of land in W. ½ SE. ¼ sec. 19, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	78.60	June 3, 1918
Vinyard, Anna	Donation of land in S. ½ sec. 22, T. 32 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Apr. 23, 1918
Worden, Lizzie H	SE. ¼ NW. ¼ and lot 3, sec. 1, T. 17 S., R. 5 W., N. M. P. M., 5.05 acres.	151.50	Aug. 14, 1917
Webb, M. H., et ux	NW. ¼ sec. 30, and SW. ¼ sec. 19, T. 33 S., R. 8 E., N. M. P. M., U. S. R. S. survey, 4.01 acres.	1.00	Oct. 10, 1917
Wadlington Community ditch		1.00	Aug. 13, 1917
Wyatt, John M	Donation of land in secs. 19 and 24, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	1.00	Jan. 7, 1918
Wells, Homer, et ux	Purchase of land in W. ½ sec. 11, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey.	481.00	Apr. 15, 1918
Ysla Community ditch		1.00	Dec. 29, 1917
Zingre, A. J., and J. W. Cathcart.	Purchase of land in E. ½ SW. ½ sec. 13, T. 33 S., R. 7 E., N. M. P. M., U. S. R. S. survey, Texas.	160.00	Mar. 18, 1918

OREGON-CALIFORNIA, KLAMATH PROJECT.

Bunnell, Robert, et ux	Part W. ½ NW. ¼ sec. 28, T. 40 S., R. 10 E., W. M.	$1.00	Sept. 25, 1917
Burriss, W. E., single	Part SE. ¼ SE. ¼ sec. 2, T. 41 S., R. 11 E., W. M.	1.00	Apr. 26, 1918
Cacka, Ignac, et ux	Part lots 2 and 7 sec. 11, T. 41 S., R. 11 E., W. M.	1.00	Do.
Cacka, Josephine, et vir	Part S. ½ SE. ¼ sec. 2, and NW. ¼ NE. ¼ sec. 11, T. 41 S., R. 11 E., W. M.	1.00	Do.
Dalton, Katie L., et vir	Part lot 2 sec. 24, T. 41 S., R. 12 E., W. M.	1.00	Apr. 10, 1918
Do	Part SE. ¼ NW. ¼ and lots 8 and 9 sec. 23, T. 41 S., R. 12 E., W. M.	1.00	Do.

Purchases of rights and property—Continued.

OREGON-CALIFORNIA, KLAMATH PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Dalton, R. L., et ux	Part lots 1 and 2 and NW. ¼ NE. ¼ sec. 23, T. 48 N., R. 5 E., M. D. M.	$1.00	Nov. 23, 1917
Dalton, W. C., et ux	Part SW. ¼ NW. ¼ sec. 24; NE. ¼ NW. ¼ sec. 23, and lot 1 sec. 14, T. 48 N., R. 5 E., M. D. M.	1.00	Apr. 10, 1918
Do	Part SE. ¼ SW. ¼ sec. 24, T. 48 N., R. 5 E., M. D. M	1.00	Do.
Ezell, W. C., et ux	Part SE. ¼ SE. ¼ sec. 10, T. 39 S., R. 9 E., W. M.	183.00	Sept. 24, 1917
Ferguson, Charles J., et ux	Part lot1 sec. 24, T. 48 N., R. 5 E., M. D. M	1.00	Nov. 23, 1917
Do	Part lot 3 sec. 23, T. 48 N., R. 5 E., M. D. M	1.00	Do.
Fitzpatrick, O. L., et ux	Part N. ½ NW. ¼ sec. 11, T. 40 S., R. 9 E., W. M.	1.00	Oct. 2, 1917
Folsom, Millie, et vir	Part SW. ¼ SW. ¼ sec. 10, T. 40 S., R. 9 E., W. M.	186.00	Sept. 24, 1917
Grennon, Fred U., et ux	Part SE. ¼ SE. ¼ sec. 26, T. 39 S., R. 9 E., W. M.	1.00	May 6, 1918
Jory, James W., single	Part NW. ¼ NE. ¼ and NE. ¼ NW. ¼ sec. 9, T. 40 S., R. 9 E., W. M.	1.00	Sept. 24, 1917
Jory, James W., et al	Part W. ½ SE. ¼ and E. ½ SW. ¼ sec. 4, T. 40 S., R. 9 E., W. M.	1.00	Sept. 25, 1917
Jory, James W., et ux	Part NW. ¼ NW. ¼ sec. 9, T. 40 S., R. 9 E., W. M.	1.00	Apr. 25, 1918
Kamarad, Joseph F., et ux	Part SE. ¼ SW. ¼ sec. 14, T. 41 S., R. 12 E., W. M.	1.00	May 5, 1918
Klamath Lake Land & Livestock Co. of California.	Part SW. ¼ NW. ¼ sec. 24; NE. ¼ NE. ¼ and E. ½ SE. ¼ sec. 23, and lot 1 sec. 14, T. 48 N., R. 5 E., M. D. M.	1.00	Feb. 21, 1918
Kotera, Joe, et ux	Part NE. ¼ NW. ¼ sec. 7, T. 41 S., R. 12 E., W. M.	1.00	May 9, 1918
Kroupa, A., et ux	Part N. ½ NW. ¼ sec. 23, T. 41 S., R. 12 E., W. M.	1.00	May 6, 1918
Lakeside Co	Part NE. ¼ SE. ¼ sec. 1, T. 41 S., R. 11 E., W. M.	1.00	Oct. 31, 1917
Otto, Armin, et ux	Part E. ½ SE. ¼ sec. 34, T. 39 S., R. 9 E., W. M.	1.00	Sept. 24, 1917
Pettit, Lydia M., et vir	Part NW. ¼ SW. ¼ and SW. ¼ NW. ¼ sec. 26, T. 40 S., R. 10 E., W. M.	1.00	May 8, 1918
Spolek, John, single	Part S. ½ SE. ¼ sec. 14, and N. ½ NE. ¼ sec. 23, T. 41 S., R. 12 E., W. M.	1.00	May 4, 1918
Tubbs, Ellsworth, et al	Part W. ½ NW. ¼ sec. 10, T. 40 S., R. 9 E., W. M.	1.00	Dec. 26, 1917

UTAH, STRAWBERRY VALLEY PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Allan, Charles E	Right of way across S. ½ SE. ¼, sec. 22, T. 8 S., R. 3 E., S. L. B. & M., area 3.44 acres, fee title.	$150.00	May 8, 1918
Bird, Richard S	Right of way across a part of S. ½ S. ½ NW. ¼, sec. 23, T. 8 S., R. 3 E., S. L. B. & M., area 2.46 acres, fee title.	175.00	Mar. 29, 1918
Bird, Roswell D., estate	Right of way across E. ½ NE. ¼ SE. ¼, sec. 22, T. 8 S., R. 3 E., S. L. B. & M., area 0.77 acre, fee title	85.00	(1)
Do	Right of way across N. ½ S. ½ NE. ¼ SE. ¼ of sec. 14, T. 8 S., R. 3 E., S. L. B. & M., area 0.38 acre, improvements only.	15.00	(1)
Blackett, John W	An easement across a part of W. ½ W. ½ NE. ¼ SE. ¼, sec. 2, T. 8 S., R. 3 E., S. L. B. & M., area 0.81 acre, perpetual easement.	100.00	
Brockbank, Wallace, et al	Right of way across E. ½ SW. ¼, W. ½ SE. ¼, W. ½ NE. ¼, and NE. ¼ NW. ¼, sec. 34, T. 8 S., R. 3 D., S. L. B. & M., area 21.50 acres, improvements only.	100.00	Mar. 13, 1918
Cone, Flora N	Right of way across S. ½ SW. ¼ SE. ¼ SE. ¼ of sec. 11, T. 8 S., R. 3 E., S. L. B. & M., area 0.27 acre, fee title.	27.00	Apr. 5, 1918
Cone, Frederick N	Right of way across N. ½ SW. ¼ SE. ¼ SE. ¼ of sec. 11, T. 8 S., R. 3 E., S. L. B. & M., area 0.40 acre, fee title.	40.00	Mar. 29, 1918
Deal, T. M	Right of way across a part of S. ½ SE. ¼ NE. ¼, sec. 11, T. 8 S., R. 3. E., S. L. B. & M., area 0.34 acre, fee title.	50.00	[2]Apr. 2, 1918
Diamond, Theodore E	Right of way across a part of S. ½ N. ½, SE. ¼ NE. ¼, sec. 11, T. 8 S., R. 3 E., S. L. B. & M., area 0.26 acre, fee title.		Do.
Egilson, Eric	Right of way across W. ½ NE. ¼, sec. 23, T. 8 S., R. 3 E., S. L. B. & M., area, 1.64 acres, fee title.	900.00	June 5, 1918
Engberg, A. G	Right of way across N. ½ SE. ¼ and SE. ¼ NE. ¼, sec. 27, T. 8 S., R. 3 E., S. L. B. & M., area 3.36 acres, improvements only.	10.00	
Hatfield, Amos	Right of way across a part of SW. ¼ NE. ¼, sec. 14, T. 8 S., R. 3 E., S. L. B. & M., area 1.34 acres, fee title.	134.00	Apr. 4, 1918
Hatfield, Joseph	Right of way across part of W. ½ NE. ¼, sec. 14, T. 8 S., R. 3 E., S. L. B. & M., area 0.55 acre, fee title.	55.00	Do.

[1] Pending probate proceedings.

[2] Probate pending.

Purchases of rights and property—Continued.

UTAH, STRAWBERRY VALLEY PROJECT—Continued.

Vendor.	Description.	Consideration.	Date of deed.
Houtz, Leslie B	Right of way across a part of NE. ¼ SE. ¼ and SE. ¼ NE. ¼, sec. 11, T. 8 S., R. 3 E., S. L. B. & M., area 1.60 acres, fee title.	$225.00	Apr. 5, 1918
Do	Right of way across part of SW. ¼ SE. ¼, sec. 2, T. 8 S., R. 3 E., S. L. B. & M., area 1.28 acres, fee title.	25.00	Apr. 1, 1918
Jensen, Joseph	Right of way across a part of NE. ¼ SE. ¼, sec. 11, T. 8 S., R. 3 E., S. L. B. & M., area 0.48 acre, fee title.	60.00	Apr. 18, 1918
Johnson, S. D	Right of way across a part of the N. ½ SE. ¼ NE. ¼, sec. 11, T. 8 S., R. 3 E., S. L. B. & M., area 0.25 acre, fee title.	37.50	Apr. 20, 1918
Lee, Arnold	Right of way across E. ½ NE. ¼, sec. 14, T. 8 S., R. 3 E., S. L. B. & M., area 4.41 acres; improvements only.	....	Pending.
Lee, William F	Right of way across N. ½ SW. ¼ SW. ¼ NW. ¼ of sec. 23, T. 8 S., R. 3. E., S. L. B. & M., area 1.33 acres, fee title.	175.00	Apr. 5, 1918
Marchbanks, Edwin D	Right of way across SE. ¼ NE. ¼ of sec. 22, T. 8 S., R. 3 E., S. L. B. & M., area 1.53 acres, fee title.	150.00	Apr. 6, 1918
Nielson, Loren	Right of way across SW. ¼ SE. ¼ of sec. 14, T. 8 S., R. 3 E., S. L. B. & M., area 1.26 acres, fee title.	92.50	Apr. 10, 1918
Do	Right of way across SE. ¼ SE. ¼ of sec. 14, T. 8 S., R. 3 E., S. L. B. & M., area 1.89 acres, improvements only.	32.50	Do.
Estate of Palfreyman, Annie H.	Right of way across E. ½ SW. ¼ NE. ¼ NE. ¼ of sec. 11, T. 8 S., R. 3 E., S. L. B. & M., area 0.15 acre, fee title.	....	Pending.
Pederson, Karl O	Right of way across NW. ¼ SE. ¼ SE. ¼ of sec. 11, T. 8 S., R. 3 E., S. L. B. & M., area 0.77 acres, fee title.	125.00	Mar. 29, 1918
Perry, Marion	Right of way across E. ½ NW. ¼ sec. 23, T. 8 S., R. 3 E., S. L. B. & M., area 1.19 acres, fee title.	119.00	Apr. 8, 1918
Perry, Hyrum B	Right of way across W. ½ NE. ¼ SE. ¼ sec. 22, T. 8 S., R. 3E., S. L. B. & M., area 2.15 acres, fee title.	150.00	Mar. 25, 1918
Settle, Marcus D	Right of way across E. ½ NW. ¼ NE. ¼ sec. 11, T. 8 S., R. 3 E.. S. L. B. & M., area 0.80 acres fee title.	75.00	Apr. 16, 1918
Snow, Edwin M	Right of way across NE. ¼ NE. ¼ sec. 27, T. 8 S., R. 3 E., S. L. B. & M., area 4.85 acres, Improvements only.	....	Pending.
Starr, Courtland A	Right of way across W. ½ SW. ¼ NE. ¼ sec. 11, T. 8 S., R. 3. E., S. L. B. & M., area 0.72 acre, fee title.	72.00	Mar. 30, 1918
Sumsion, Wm. E	Right of way across W. ½ SE. ¼ SE. ¼ sec. 11. T. 8 S., R. 3 E., S. L. B. & M., area 0.20 acres, fee title.	25.00	Do.
Thome, E. T	Right of way across N. ½ SE. ¼ NE. ¼ sec. 11, T. 8 S., R. 3 E., S. L. B. & M., area 0.28 acre, fee title.	42.00	Apr. 12, 1918
Weight, Alfred W	Right of way across N. ½ SE. ¼ SE. ¼ sec. 2, T. 8 S., R. 3 E., S. L. R. & M., area 1.19 acres, fee title.	75.00	
Wing, Bennett et al	Right of way across S. ½ S. ½, NE. ¼ SE. ¼ sec. 14, T. 8 S., R. 3 E., S. L. B. & M., area 0.36 acre, improvements only.	....	Pending.
White, Allen	Right of way across SW. ¼ SE. ¼, sec 27, T. 8 S., R. 3 E., S. L. B. & M., area 1.58 acres, no improvements and no fee.	....	Do.
Whiting, Anna W	Right of way across W. ½ NW. ¼ NE. ¼ NE. ¼, sec. 11, T. 8 S., R. 3 E., S. L. B. & M., area 0.03 acre, fee title.	....	Do.
Whiting, Ray	Right of way across N. ½ NE. ¼ SE. ¼ sec. 14, T. 8 S., R. 3 E., S. L. B. & M., area 0.77 acre, improvements only.	15.00	Apr. 25, 1918

Purchases of rights and property—Continued.

WASHINGTON, OKANOGAN PROJECT.

Vendor.	Description.	Consideration.	Date of deed.
Cheetham, John J., et ux	Lots 3, 4, 5, 6, 7, 8, and 9 in block T, Conconully Mining Co.'s addition to the town of Conconully, Wash.	$1,000.00	Aug. 2, 1917
Kane, John F., et ux	Lots 10, 11, and 12, block L, Conconully Mining Co.'s addition.	400.00	June 29, 1918
Lovejoy, C. H., et ux	Lots 10, 11, 12, 13, 14, 15, 16, 17, 18, and 19, block T, Conconully Mining Co.'s addition.	1,500.00	Aug. 4, 1917
Marshall, John H., et ux	Lots 11 and 12, in block U, Conconully Mining Co.'s addition.	1,000.00	June 26, 1918
McLean, N. B., et ex	Lots 15 and 16 in block S, Conconully Mining Co.'s addition.	210.00	Aug. 2, 1917
McLean, F. F., et ux	Lots 5, 6, 7, and 8, block U, Conconully Mining Co.'s addition.	700.00	June 11, 1918
McDonald, Neil R., et ux	Lots 9 and 10, block U, Conconully Mining Co.'s addition.	700.00	Aug. 2, 1917
Morgan, John J.	Lots 15 and 16 in block U, Conconully Mining Co.'s addition.	70.00	June 26, 1918
Payne, Marguerite B	Lots 1 and 2 in block U, Conconully Mining Co.'s addition.	50.00	Aug. 23, 1917
Snowden, Benjamin Terrell and Snowden, Nellie.	Damages to lots 15 and 16, in block U, Conconully Mining Co.'s addition.	35.00	Dec. 6, 1916
Weeks, Carrie M., et vir	Lots 20, 21, 22, 23, 24, and 25 in block T, Conconully Mining Co.'s addition.	1,000.00	Aug. 2, 1917
Whitworth, N. E.	Lots 3 and 4 in block U, Conconully Mining Co.'s addition.	300.00	Aug. 28, 1917

WASHINGTON, YAKIMA PROJECT, TIETON UNIT.

Hughes, John L.	Land for patrol house site in sec. 19, 13, 18	$600	May 22, 1918

PRINCIPAL CURRENT CONTRACTS.

In the following tables are shown, by projects, data relative to the principal contracts in operation or completed during the fiscal year ending June 30, 1918:

Principal current contracts.

ARIZONA-CALIFORNIA, YUMA PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
486	1917. July 31	Imperial irrigation district.	Construction of weir dam in Colorado River.	$22,066.83	$22,066.83	(1)
503	June 28	Fairbanks Morse Co.	Pumping machinery for Y. V. dredging plant.	23,290.50	23,290.50	1918. Apr. 9
510	Oct. 24	Whiting Foundry Co.	Traveling crane and crane rail.	2,340.00	2,340.00	Jan. 8
511	1918. Feb. 16	Imperial irrigation district.	Preliminary survey for all-American canal into Imperial Valley.	45,000.00	45,000.00	....

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
	1918. Feb. 28	L. B. Little and E. T. Berry.	High line feeders	$1,233.00	$1,110.73	1918. June 21
	Apr. 29	John J. Halliday	Schedule 4, McClanahan lateral	2,594.00	2,561.10	Dec. 15
	May 7	R. E. Wear	Schedule 5, McClanahan lateral	2,252.00	2,235.82	Dec. 17
	May 16	E. T. Berry	Schedule 7, McClanahan lateral	1,999.00	1,272.73	Dec. 15
	May 18	John J. Halliday	Schedule 6, McClanahan lateral	1,834.00	1,671.83	Dec. 17
	May 27	E. T. Berry	Schedules 8 and 9, McClanahan lateral.	4,463.50	....	(2)

IDAHO, KING HILL PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
	1918. Jan. 18	R. Hardesty Mfg. Co.	Metal flume, bands, etc	$702.58	$702.58	1918. Mar. 25
	Mar. 18	R. Hardesty Mfg. Co.	Steel headgates	1,467.65	....	July 1
	1917. Dec. 17	King Hill irrigation district and State of Idaho.	Reconstruction of King Hill project.	1,000,000.00	....	
	1918. Jan. 21	Pacific Coast Pipe Co.	Staves, flume	725.00	725.00	Feb. 4
	1917. Nov. 17	East Oregon Lumber Co.	Lumber	2,685.26	2,685.26	1917. Dec. 1
	Aug. 6	Hallack & Howard Lumber Co.	Experimental flume improvements.	1,044.06	1,044.06	
	1918. Feb. 28	Idaho Power Co.	Malad flume	2,000.00	....	
	Feb. 5	Paul J. Kalman Co	Reinforcing steel	4,215.35	4,215.35	1918. Apr. 1

[1] Completed.

[2] 200 days after date of approval; June 30, 1918, not approved.

Principal current contracts—Continued.

MONTANA, FLATHEAD (INDIAN) PROJECT.[1]

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
731	1916. Oct. 19	Pearson Construction Co.	Earthwork and structures, Pablo laterals 43A and 50A, and sublaterals.	$38,236.50	$39,539.64	1917. June 15
739	Nov. 17	Welch Bros. & Hannaman.	Structures 30MA and sublaterals, schedule 4, specification 350.	17,255.80	17,173.80	May 15
738	Dec. 4	Mendenhall, Bird & Co.	Earthwork, post 30MA sublaterals.	44,541.00	51,729.47	June 15
756	1917. May 15	Ball & Jaffe	Excavation of Camas laterals and sublaterals, schedules 1, 2, 3, 4, specification 359.	48,197.00	[2] 64,402.19	Oct. 31
757	May 3	Mendenhall, Bird & Co.	Excavation, post laterals A and C, schedules 5 and 6, specification 359.	10,127.00	12,474.49	Do.
781	Aug. 24	C. B. Long	Excavation and concrete lining, MA lateral, schedule 1, specification 368.	37,620.00	36,003.53	1918. May 31

MONTANA, HUNTLEY PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
133D	1918. Feb. 11	Pacific Coast Pipe Co.	Wood-stave pipe	$3,761.00	$3,761.00	1918. July 10
116D	1917. Nov. 30	Fairbanks-Morse & Co.	Internal-combustion engines	21,838.00	21,838.00	Apr. 4

MONTANA, MILK RIVER PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
662	1915. Nov. 6	Lakeside Bridge & Steel Co.	Bridge and movable crest gates, Vandalia diversion dam.	$22,211.86	$19,248.20	
664	1916. Nov. 19	.....do	Hoisting machinery and operating equipment, Vandalia diversion dam.	[3] 17,042.51	17,059.99	1917. Sept. 16
714	July 22	The Security Bridge Co.	Structures, Bowdoin laterals	[3] 7,847.50	7,591.26	July 31
723	Sept. 5	O'Connor & Whalen.	Earthwork, Nelson Reservoir south laterals.	[3] 108,352.50	99,877.59	Nov. 30
734	Oct. 23	Booth & Knipe	Structures, Nelson Reservoir south laterals.	[3] 28,384.50	29,688.77	1918. June 30
763	1917. June 7	Rolla Barnes	Excavation and earth lining, Nelson Reservoir south canal.	[3] 5,344.00	4,843.35	1917. Sept. 11
782	Nov. 10	Des Moines Bridge & Iron Works.	Movable crest, service bridge and hoist cars for Dodson Dam.	20,100.00	17,100.00	(4)
145D	1918. Apr. 9	R. Hardesty Mfg. Co.	Gates and lifting devices for Cow Creek wasteway.	[3] 611.00	611.00	1918. June 4
	June 20	Weston & Facey	33 miles of telephone line, Nelson Reservoir to Beaverton and Paisley to Willow Creek.	2,753.50	None.	Oct. 15

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[1] All contracts completed at end of fiscal year 1918.

[2] Contract suspended and completed by Government force.

[3] Completed.

[4] Bridge material, Feb. 13, 1918; hoisting units, Mar. 2, 1918; erection, 50 days after notice by United States to commence work.

Principal current contracts—Continued.

MONTANA, MILK RIVER PROJECT, ST. MARY STORAGE UNIT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
	1917. Jan. 8...	East St. Louis Bridge Co.	Riveted steel highway bridge at Sherburne Lakes Dam.	....	[1] $1,461.00	([2])
667	1915. Nov. 26.	Lakeside Bridge & Steel Co.	Operating mechanism for slide gates, Sherburne Lakes Dam.	....	[1] 2,517.50	([3])

MONTANA, SUN RIVER PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
	1913. Feb. 19..	Great Falls Power Co.	Electrical energy..............	$60,000.00	$20,937.94	1919. Sept. 29
649	1915. Sept. 2..	West Coast Construction Co. & Hans Pederson.	Structures, Greenfields first unit.	[4] 65,976.30	17,214.55	1916. July 26
	1916. Oct. 16..	C. J. Erickson & Wm. Fransen.	Completion of suspended contract No. 649 with West Coast Construction Co. and Hans Pederson.	[5] 48,761.75	10,382.38	1917. June 30
	1917. Sept. 29.	......do..............	Completion by United States of suspended contract 649 with West Coast Construction Co. & Hans Pederson.	38,379.37	12,281.87	([6])
	Aug. 29.	I. J. Denton[7].........	Laterals and culvert outlet drains, Greenfields first unit, schedule 1.	1,549.25	[8] 1,369.63	Nov. 12
	...do...	F. T. King[7]..........	Laterals and culvert outlet drains, Greenfields first unit, schedule 2.	1,740.00	[8] 1,564.00	Nov. 12

NEBRASKA-WYOMING, NORTH PLATTE PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
689	1916. Apr. 15.	Security Bridge Co...	Structures, Fort Laramie Canal, schedule 1, specification 325.	$39,877.00	$44,297.34	1917. Sept. 30
697	June 13.	MacArthur Bros. Co..	Construction of tunnels Nos. 1 and 2, Fort Laramie Canal, specification 334.	242,032.50	[9] 256,407.80	1918. Jan. 27
700	June 22..	......do..............	Earthwork, Fort Laramie Canal, division 3, schedule 1, specification 336.	38,225.00	[9] 45,157.01	1917. July 25
735	Oct. 19..	Winston Bros. Co....	Earthwork and structures, schedules 1 to 7, specification 348.	270,061.00	276,000.00	1918. Aug. 1
	1917. Mar. 10..	Krauss & Krauss....	Earthwork, laterals division 1, Fort Laramie unit, schedule 2.	1,414.80	[9] 1,393.90	1917. Aug. 3
	Apr. 2...	Harold Purcell.......	Earthwork laterals, division 1, Fort Laramie unit, schedules 1 and 3.	2,304.80	[9] 2,491.01	Sept. 10
752	Apr. 18..	MacArthur Bros. Co..	Earthwork division 5, Fort Laramie Canal, schedule 5, specification 357.	172,382.50	123,775.00	1918. Nov. 30
752	...do....	......do..............	Structures divisions 1 to 4, Fort Laramie Canal, schedule 7, specification 357.	41,584.75	42,626.33	July 31
753	Apr. 19..	Winston Bros. Co....	Earthwork and structures division 5, Fort Laramie Canal, schedules 1, 2, 3, 4, 6, and 7, specification 357.	217,845.00	56,973.00	Nov. 30

[1] Actual earnings to June 30, 1917.

[2] Material to be delivered at factory by June 1, 1917. Erection to be completed within 50 days of receipt of notice to begin work. Erection completed in September, 1917. Contract price for erecting $700.

[3] Pistons and piston rods to be furnished when required. Furnished during October, 1917. Contract price $170.

[4] Suspended Sept. 18, 1916.

[5] Suspended Sept. 29, 1917.

[6] No limit provided.

[7] Awarded and executed in project office.

[8] Completed.

[9] Completed.

Principal current contracts—Continued.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
753	1917. Apr. 25.	The R. Hardesty Mfg. Co.	Cast-iron gate stands, Fort Laramie unit, specification 79-D.	$972.58	[1] $972.58	1918. Oct. 13
	May 4...	H. E. Knowlton....	Riprapping canal banks, Fort Laramie Canal, specification 257-F.	3,060.00	2,948.03	Nov. 17
	June 15.	Purcell & Krauss.....	Outlet drains for culverts, Fort Laramie Canal, specification 278-F.	1,410.50	[1] 1,440.13	Aug. 16
	June 22..	Price Brothers.......	Earthwork, laterals division 1, Fort Laramie unit, schedules 7, 8, and 9.	4,111.00	[1] 4,116.32	Nov. 16
773	July 17..	J. E. Hilton..........	Earthwork, division 6, Fort Laramie Canal, schedule 1, specification 367.	53,410.00	41,982.93	1918. Nov. 30
	July 24..	J. C. Hinds..........	Earthwork, laterals division 1, Fort Laramie unit, schedules 10 and 11.	3,113.50	[1] 3,138.53	Jan. 15
	...do.....	Price Bros...........	Earthwork, laterals division 1, Fort Laramie unit, schedules 4 and 5.	3,707.50	[1] 3,887.15	Apr. 2
	Aug. 13.	T. H. Murphy.......	Earthwork, laterals division 1, Fort Laramie unit, schedule 6.	1,746.50	[1] 1,310.98	Jan. 20
	Aug. 15.	The Vulcan Iron Works Co.	Gates, Fort Laramie Canal, specification 99-D.	1,538.00	[1] 1,538.00	1917. Dec. 13
	Sept. 25.	The Missouri Valley Bridge & Iron Co.	Steel bents for checks, Fort Laramie Canal, schedule 1, specification 108-D.	840.00	[1] 840.00	Nov. 15
	...do....	Monarch Engr. Co...	Metal parts for highway bridges, Fort Laramie Canal, specification 108-D.	2,130.00	[1] 2,130.00	Oct. 29
	Sept. 27	J. L. Hamp..........	Earthwork, laterals division 1, Fort Laramie unit, schedules 12 and 13.	3,362.50	1,392.50	1918. July 1
	...do.....	Carl Krauss..........	Earthwork, laterals division 1, Fort Laramie unit, schedules 14 and 15.	3,214.58	[1] 2,623.07	July 1
	...do.....	Hopkins & Renedick.	Outlet drains for culverts, Fort Laramie Canal, specification 323-F.	3,261.98	[1] 3,149.23	May 1
	Oct. 6...	J. C. Hinds..........	Excavation for siphon laterals 35.4, Fort Laramie unit, laterals division 1.	1,287.00	[1] 1,284.11	Feb. 1
	Oct. 22..	The R. Hardesty Mfg. Co.	Farm turnout gates, Fort Laramie unit, specification 114-D.	435.50	[1] 435.50	1917. Dec. 1
	Nov. 20.	Krauss & Krauss.....	Earthwork, laterals division 1, Fort Laramie unit, schedules 16, 17, and 18.	4,632.17	[1] 4,650.00	1918. May 31
787	Dec. 4...	Monighan Machine Co.	2, 1T gasoline walking draglines, specification 111-D.	21,140.00	10,590.00	
790	1918. Jan. 24..	Wm. L. Connelly....	Earthwork, Cherry Creek lateral, Fort Laramie unit, specification 373.	45,135.00	22,095.22	Oct. 1
789	Jan. 29..	Trump Mfg. Co......	Turbines for Lingle Power Plant, specification 121-D.	9,730.00	....	July 20
791	Feb. 2...	Allis, Chalmers Co...	Generators for Lingle Power Plant, specification 121-D.	7,760.00	....	June 1
797	Feb. 12.	Westinghouse Elec. & Mfg. Co.	Switchboard equipment, Lingle Power Plant, specification 121-D.	3,415.00	....	July 12
793	Feb. 26	Bucyrus Co..........	3 electric drag-line excavator, specifications 375.	78,075.00	....	1918. Dec 3 Dec. 13 Dec. 23
794	Feb. 26	General Elec. Co.....	Transformers Lingle Power Plant, specification 122-D.	10,650.00	....	June 10
	Mar. 12	J. C. Hinds..........	Earthwork, lateral division 2, Fort Laramie unit, sch. 2 and 3.	4,100.00	$2,360.00	1919. Jan. 31
	Mar. 20	The R. Hardesty Mfg. Co.	Gates, sched. 1, specification 141-D.	769.09	....	1918. June 29

[1] Completed.

Principal current contracts—Continued.

NEBRASKA-WYOMING, NORTH PLATTE PROJECT—Continued.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
794	1918. Apr. 6	J. C. Hinds	Earthwork, lateral division 2, Fort Laramie unit, sch. 4 and 5.	$3,901.50	$1,995.00	1919. Jan. 31
	...do....	J. W. Talmage	Earthwork, Spottedtail Wasteway Interstate Canal.	803.50	[1] 852.15	1918. June 15
	Apr. 9	Small & Clark	Earthwork, lateral division 1, Fort Laramie unit, specification 503-F.	4,845.75	[1] 619.25	May 15
	May 6	Price Bros	Earthwork, lateral division 1, Fort Laramie unit, specification 505-F.	2,000.00	1,513.97	Sept. 1
799	May 14	J. E. Hilton	Earthwork, core banks and overhaul, division 7, Fort Laramie Canal, specification 377.	79,440.00	836.00	1919. July 1
801	June 10	Pacific Tank & Pipe Co.	Wooden stave penstock, Lingle Power Plant, specification 152-D.	5,577.00	....	1918. July 20

NEW MEXICO-TEXAS, RIO GRANDE PROJECT

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
743	1916. Dec. 9	Bucyrus Co	Drag-line excavators	$74,000.00	$62,045.00	
750	1917. Feb. 27	Wisconsin Bridge & Iron Co.	Bridge for Garfield flume	[1] 20,000.00	20,000.00	1917. June 4
751	Mar. 22	R. Hardesty Mfg. Co.	Flume material, Garfield flume	7,000.00	[1] 7,000.00	July 1
762	Apr 17	Bucyrus Co	Drag-line excavators	74,000.00	....	
777	July 6	Knowles & Warren	Earthwork, Garfield Canal	35,000.00	8,230.00	(2)
779	Sept. 20	R. Hardesty Mfg. Co.	Flume material	9,573.04	[1] 9,573.04	Dec. 21
784	Nov. 19	Lee Moor Cont. Co	Earthwork for Juan d'Herrera lateral.	8,688.35	[1] 8,688.35	Dec. 30
788	1918. Jan. 29	.....do	.....do	16,482.60	[1] 18,493.86	1918. Mar. 10
	1917. Dec. 4	.....do	Earthwork, Garfield Canal	5,867.78	[1] 5,867.78	Feb. 1
792	1918. Feb 2	Harlan, Wright & Stewart.	Earthwork, Hatch Canal	17,583.00	[1] 14,880.08	Mar. 31
	Jan. 7	A. J. Brice [3]	.....do	3,086.40	[1] 3,826.46	Apr. 23
	...do....	G. Carreras [3]	.....do	2,778.40	[1] 4,251.94	Apr. 4
	...do....	B. Silva [3]	.....do	2,766.60	[1] 3,072.80	Apr. 20
	...do....	G. J. Romig [3]	.....do	3,931.20	[1] 5,751.20	Mar. 24
	...do....	N. B. Romig [3]	.....do	4,612.00	[1] 4,546.13	Mar. 26
	...do....	Lee Moor Cont. Co.[3]	Earthwork, Montoya lateral, schedule 2.	2,998.00	[1] 3,250.00	May 27
	Mar. 8	J. L. McWilliams [3]	Earthwork, Montoya lateral, schedule 1.	3,583.20	[1] 3,592.52	May 6
	Apr. 15	Harlan & Wright[3]	Earthwork, Montoya lateral, schedule 3.	3,181.48	[1] 3,764.49	May 25
	Apr. 3	S. Abraham [3]	Earthwork, Montoya lateral, schedule 4.	2,055.50	[1] 1,928.80	June 11
	Apr 8	Lee Moor Cont. Co.[3]	Earthwork, Montoya lateral, schedule 5, Branch B, C, and C'.	3,806.00	[1] 1,433.04	Do.
	Mar. 27	Beaumont Lbr. Co.	Purchase of lumber for El Paso Valley lateral construction.	9,512.78	....	
13108	Mar. 21	Southern Texas Lbr. Co.	.....do	5,000.00	2,945.19	
762	Feb. 7	Bucyrus Co	Amendment of continuing 762 for drag-line excavators.	27,472.00	....	
790	Apr. 13	Lee Moor Const. Co.	Garfield Canal, completion of suspended contract No. 777.	34,421.59	25,484.24	July 12
800	May 24	Jennings Construction Co.	[illegible]sburg drain	52,500.00	....	1920. 3 Apr.

[1] Completed.
[2] Suspended.
[3] Awarded and executed in project office.

Principal current contracts—Continued.

UTAH STRAWBERRY VALLEY PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
2266	1918. Apr. 12	H. T. Reynolds	Earthwork, division G, schedules 1 and 2, Mapleton lateral.	$4,074.00	$4,100.00	1918. June 6
2267	...do	W. A. McKenzie	Earthwork, division H, schedules 1 and 2, Mapleton lateral.	3,867.00	3,900.00	Do.
2270	...do	G. R. Maycock	Earthwork, division I, schedules 1 and 2, Mapleton lateral.	4,193.00	4,200.00	Do.
2269	...do	John L. Whiting	Earthwork, division J, schedules 1 and 2, Mapleton lateral.	4,450.00	4,500.00	Do.
2268	...do	H. T. Reynolds, jr	Earthwork, division K, schedules 1 and 2, Mapleton lateral.	3,915.00	3,900.00	Do.
	1916. Jan. 21	Heber Horse and Cattle Association & Wallsburg Live Stock Association.	Lease of 51,840 acres of land in Strawberry Valley.	61,250.00	30,625.00	1920. Nov. 15
	...do	.....do	Lease of 8,320 acres of land in Strawberry Valley.	10,500.00	5,250.00	Do.
	1918. June 17	C. F. Dixon	Lease of 5,600 acres of land in Goshen Valley.	325.00	27.00	1919. June 7
	1913. Dec. 9	Goshen Gun Club	Lease of 1,818.6 acres of land in Goshen Valley.	300.00	240.00	Feb. 1
	1918. Jan. 18	Olof Peterson and John L. Ellertson.	Lease of 5,250 acres of land on West Mountain.	525.00	105.00	1923. Feb. 1

WASHINGTON, YAKIMA PROJECT, SUNNYSIDE UNIT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
625	1915. Mar. 25	Chas. C. Moore	Hydraulic machinery	$10,611.00	$10,611.00	1917. Jan. 16
724	1916. Sept. 6	Trump Mfg. Co	.....do	13,250.00	3,250.00	(1)
726	Sept. 8	S. Morgan Smith Co.	Direct pumping units	10,250.00	10,250.00	(1)
730	Oct. 6	Westinghouse Elec. M. Co.	Switchboard apparatus	5,670.00	5,670.00	Aug. 26
795	1918. Mar. 11	Fairbanks, Morse & Co.	Direct pumping units	16,050.00	....	1918. Sept. 30
796	Mar. 16	Pac. Coast Pipe Co	Wood-stave pipe	30,129.00	30,129.00	May 23
	1916. Oct. 13	Fairbanks, Morse Co.	Pumping equipment	1,640.00	1,640.00	1917. July 11
59	Feb. 29	Pelton Water Wheel Co.	Direct pumping units	7,063.00	7,063.00	(2)
	1918. Apr. 16	Pac. Tank & Pipe Co.	Wood-stave pipe	4,655.00	2,327.00	1918. June 11
	Jan. 19	Platt Iron Works	Repairs to pumping machinery	2,600.00	2,600.00	....

WASHINGTON, YAKIMA PROJECT, TIETON UNIT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
	1918. Mar. 25	A. G. Swan and F. C. Howard.	Patrol house for patrol district No. 10.	$1,873.65	....	1918. May 25

WYOMING, SHOSHONE PROJECT.

No.	Date.	Contractor.	Description.	Estimated value.	Estimated earnings June 30, 1918.	Completion due.
737	1916. Sept. 11	Hoyt Hayden	Frannie Canal extension and lateral.	$112,243.91	$109,205.19	....
736	Oct. 18	Peter Shirts	.....do	12,865.81	5,023.86	....
758	1917. Apr. 26	H. S. Jolley	.....do	7,670.00	2,997.09	....
755	Apr. 16	N. O. Mortensen	.....do	9,440.00	773.00	....
754	....do	Tebbs & Taggart	.....do	19,700.00	6,988.95	....
778	July 30	David Lewis	.....do	10,610.00	4,852.50	....
	Nov. 30	Wm. Peterson	Earthwork	860.00	444.00	....
	Nov. 26	Lynn Bros	Backfilling	3,085.00	2,034.72	....
	Dec. 27	Dickson Bros	Hauling sand and gravel	....	....	....
	1918. Feb. 25	.....do	.....do	3,400.00	2,574.00	....
	Jan. 17	C. A. Noland	.....do	750.00	712.50	....
	1917. Dec. 4	Mathews & Crashley.	Hauling pipe	293.40	314.50	....

[1] Ninety days after approval of drawings.

[2] Last week in February.

CEMENT.

Tabulation of long-time cement tests from Jan. 1, 1904, to June 30, 1918.

Brand.	Composition of briquets.	Tensile strength.															
		3 months.		6 months.		1 year.		2 years.		3 years.		5 years.		7½ years.		10 years.	
		Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.	Number of briquets.	Pounds per square inch.
Ash grove	Neat	40	770	40	757	40	732	40	759	40	750	40	723	25	690	......	......
	3 to 1	40	470	40	459	40	439	40	439	40	432	40	448	25	431	......	......
Atlas (Hannibal, Mo.)	Neat	30	705	30	670	30	689	30	739	30	692	30	690	20	667	5	676
	3 to 1	30	467	30	437	30	439	30	413	30	405	30	416	20	406	5	411
Concrete	Neat	40	809	40	766	40	756	30	695	30	670	15	671	15	605	......	......
	3 to 1	45	469	45	472	40	472	30	445	30	433	15	409	15	422	......	......
Cowboy	Neat	40	846	40	843	40	808	40	781	40	754	30	727	25	695	25	730
	3 to 1	40	443	40	448	40	441	40	431	40	412	30	427	25	437	25	425
Dewey	Neat	15	769	15	831	15	788	15	753	15	758	5	754	5	729	......	......
	3 to 1	15	459	15	469	15	457	15	418	15	404	5	427	5	461	......	......
El Toro	Neat	445	713	315	824	205	836	125	813	105	858	55	777	25	769	......	......
	3 to 1	450	351	320	427	205	433	125	440	105	433	55	439	25	466	......	......
Golden Gate	Neat	260	761	115	708	105	692	95	680	90	696	80	654	30	660	......	......
	3 to 1	265	438	120	426	105	407	95	415	90	414	80	433	30	420	......	......
Ideal	Neat	130	729	130	727	130	708	120	705	120	690	105	665	85	664	50	664
	3 to 1	135	458	135	462	130	467	120	452	120	435	105	430	85	428	50	401
Inland (Lehigh)[1] (Metalline Falls, Wash.).	Neat	40	808	40	786	40	796	40	754	15	724	......	......	......	......	......	......
	3 to 1	40	461	40	444	40	449	40	397	15	361	......	......	......	......	......	......
Iola	Neat	150	842	145	792	145	790	135	778	120	754	120	723	105	726	55	726
	3 to 1	150	458	145	455	145	427	135	413	120	390	120	404	105	398	55	390
Lehigh (Mason City, Iowa)	Neat	25	757	25	751	25	775	25	798	25	736	10	690	......	......	......	......
	3 to 1	25	459	25	446	25	436	25	413	25	402	10	452	......	......	......	......
Marquette	Neat	35	755	35	737	35	724	35	749	35	704	35	706	35	707	15	669
	3 to 1	35	441	35	441	35	446	35	459	35	437	35	434	35	438	15	470
Mount Diablo	Neat	35	759	30	721	30	707	30	693	30	715	30	703	5	698	......	......
	3 to 1	35	414	30	431	30	414	30	406	30	410	30	415	5	334	......	......
Ogden	Neat	90	756	90	747	90	750	85	735	75	734	25	676	5	644	......	......
	3 to 1	90	446	90	455	90	452	85	449	75	405	25	444	5	427	......	......
Red Devil (Devil's Slide, Utah)	Neat	120	792	120	782	120	778	100	779	100	763	50	756	30	758	5	747
	3 to 1	120	455	120	456	120	433	100	409	100	399	50	392	30	424	5	374
Red Devil (Trident, Mont.)	Neat	95	728	95	711	95	689	80	683	65	652	30	638	5	674	......	......
	3 to 1	100	487	100	479	95	470	80	462	65	437	30	473	5	410	......	......

Red Diamond[2] (Utah)	Neat	95	722	95	751	90	759	90	761	90	738	80	711	45	691	40	681
	3 to 1	100	470	95	486	90	481	90	448	90	420	80	414	45	413	40	402
Riverside	Neat	45	757	45	762	45	752	25	746	25	749	10	716	....	....	....	....
	3 to 1	45	460	45	473	45	447	25	428	25	407	10	427	....	....	....	....
Spokane	Neat	25	766	25	745	25	753	25	732	20	761	....	....	....	....	....	....
	3 to 1	30	449	30	439	25	428	25	375	20	355	....	....	....	....	....	....
Standard (Napa Junction, Cal.)	Neat	50	732	40	736	40	770	40	710	40	742	10	608	10	636	....	....
	3 to 1	55	478	45	491	40	521	40	520	40	491	10	481	10	553	....	....
Sunflower (Independence, Kans.)	Neat	15	925	15	881	15	824	15	803	15	739	15	782	10	819	10	760
	3 to 1	15	496	15	504	15	470	15	467	15	445	15	450	10	421	10	423
Sunflower (Iola, Kans.)	Neat	55	820	55	807	55	765	55	755	55	744	55	714	45	752	25	695
	3 to 1	55	434	55	424	55	387	55	367	55	373	55	371	45	377	25	369
Universal (South Chicago, Ill.)	Neat	70	860	70	817	70	799	70	781	70	751	70	745	70	738	60	734
	3 to 1	70	420	70	407	70	402	70	372	70	346	70	351	70	356	60	338
Yankton	Neat	60	791	60	785	60	773	60	748	60	768	60	732	60	759	30	668
	3 to 1	60	433	60	440	60	430	60	414	60	420	60	412	60	409	30	410
Total	Neat	2,005	762	1,670	790	1,585	762	1,405	748	1,310	735	960	709	655	713	320	702
	3 to 1	2,045	430	1,770	442	1,585	441	1,405	428	1,310	412	960	416	655	412	320	391

[1] Made at same plant. Brand name changed from Inland to Lehigh April, 1914.

[2] Made at same plant. Brand name changed from Red Diamond to Utah June, 1910.

UNIT BIDS AND CONTRACT PRICES.

Unit bids and contract prices on formal specifications.

BACK FILLING.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Milk River	June 26, 1918	4 M.R.P.	Backfill, Cow Creek wasteway	Cubic yard	600	$0.30	$0.30	$0.30
Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, structures, schedule 5.	do	11,300	.40	(1)	Rejected.

BRIDGES.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Milk River, St. Mary storage.	Dec. 20, 1916	F-13	Four steel pony truss bridges, 41 feet 6 inches each:					
			Item 1 of schedule, materials	Lump sum				$1,461.00
			Item 2 of schedule, erecting					700.00

BRIDGES, SUPERSTRUCTURE, ERECTING.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 5, 45-foot span timber bridges.	Per bridge	8	$550.00	(1)	Rejected.

CANAL LINING, CONCRETE.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Montana, Flathead (Indian)	July 18, 1917	368	MA lateral, 3-inch lining	Square foot	105,000	$0.17		$0.17

CONCRETE.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 5	Cubic yard	2,925	$24.00	(1)	Rejected.

CULVERT MATERIAL, FURNISHING.

New Mexico, Carlsbad	Jan. 23, 1918	131-D	Roads, drain D	Job, linear feet.	156	[2] $1,093.69	[1] $1,121.60	....

DRY RUBBLE WALL.

Montana, Flathead (Indian)	July 18, 1917	368	MA lateral	Cubic yard	1,050	$4.00	....	$4.00

EARTHWORK.

Montana, Milk River	Sept. 27, 1917	2156	Dodson South Canal, lateral D. S.-170-6-0	Cubic yard, class 1.	3,500	$0.24	....	$0.24
Do	do	2156	do	Cubic yard, class 2.	10	.50	....	.50
Do	do	2156	do	Cubic yard, class 3.	5	1.00	....	1.00
Do	do	2156	do	Station yard, overhaul.	500	.02	....	.02
Do	Oct. 19, 1917	2 M.R.P.	Dodson North and South Canal, laterals DN-32, excavation.	Cubic yard	5,000	.25	....	.25
Do	do	2 M.R.P.	Dodson North and South Canal, laterals DN-32, overhaul.	Station cubic yard.	500	.02	....	.02
Do	do	2 M.R.P.	Dodson North and South Canal, laterals WD-13, excavation.	Cubic yard	1,800	.30	....	.30
Do	do	2 M.R.P.	Dodson North and South Cabal, laterals DS-50, excavation.	do	350	.35	....	.35
Do	Nov. 6, 1917	3 M.R.P.	Dodson South Canal, waste-water ditch W-2.	do	400	.195	$0.34	.195
Do	do	3 M.R.P.	Dodson South Canal, waste-water ditch W. 5-3 L.	do	800	.19	.2925	.19
Do	do	3 M.R.P.	Dodson South Canal, station 801+50-801+75.	do	200	.19	.245	.19
Utah, Strawberry Valley	Apr. 1, 1918	2266	All classes, division G, schedules 1 and 2, Mapleton lateral, items 1, 2, and 3.	do	13,550	.28	....	.28
Do	do	2266	Overhaul, division G, schedules 1 and 2, Mapleton lateral, item 4.	Station yard	2,000	.02	....	.02
Do	do	2266	Rolled embankment, division G, schedules 1 and 2, Mapleton lateral, item 5.	Cubic yard	1,200	.20	....	.20
Do	do	2267	All classes, division H, schedule 1, Mapleton lateral, items 1, 2, and 3.	do	6,500	.28	....	.28
Do	do	2267	All classes, division H, schedule 2, Mapleton lateral, items 1, 2, and 3.	do	4,250	.43	....	.43
Do	do	2267	Overhaul, division H, schedules 1 and 2, Mapleton lateral, item 4.	Station yard	3,000	.02	....	.02

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[1] Only one bid.

Freight included

Unit bids and contract prices on formal specifications—Continued.

EARTHWORK—Continued.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Utah, Strawberry Valley	Apr. 1, 1918	2267	Rolled embankment, division H, schedules 1 and 2, Mapleton lateral, item 5.	Cubic yard	800	$0.20	....	$0.20
Do	do	2268	All classes, division K, schedule 1, Mapleton lateral, items 1, 2, and 3.	do	4,000	.46	....	.46
Do	do	2268	All classes, division K, schedule 2, Mapleton lateral, items 1, 2, and 3.	do	6,650	.30	....	.30
Do	do	2268	Overhaul, division K, schedules 1 and 2, Mapleton lateral, item 4.	Station yard	2,000	.02	....	.02
Do	do	2268	Rolled embankment, division K, schedules 1 and 2, Mapleton lateral, item 5.	Cubic yard	200	.20	....	.20
Do	do	2269	All classes, division J, schedules 1 and 2, Mapleton lateral, items 1, 2, and 3.	do	11,000	.35	....	.35
Do	do	2269	Overhaul, division J, schedules 1 and 2, Mapleton lateral, item 4.	Station yard	3,000	.02	....	.02
Do	do	2269	Rolled embankment, division J, schedules 1 and 2, Mapleton lateral, item 5.	Cubic yard	2,700	.20	....	.20
Do	do	2270	All classes, division I, schedule 1, Mapleton lateral, items 1, 2, and 3.	do	4,600	.40	....	.40
Do	do	2270	All classes, division I, schedule 2, Mapleton lateral, items 1, 2, and 3.	do	4,350	.38	....	.38
Do	do	2270	Overhaul, division I, schedules 1 and 2, Mapleton lateral, item 4.	Station yard	7,000	.02	....	.02
Do	do	2270	Rolled embankment, division I, schedules 1 and 2, Mapleton lateral, item 5.	Cubic yard	2,800	.20	....	.20

ENGINES, INTERNAL COMBUSTION.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Lowest.	Next.	Contract price.
Montana, Huntley	Oct. 30, 1917	116-D	Auxiliary pumping plant:					
Do	do	116-D	Engines	Lump sum	2	$19,700.00	$21,130.00	$21,130.00
Do	do	116-D	Air starter	do	1	708.00	....	708.00

EXCAVATION, CLASS 1.

Colorado, Uncompahgre Valley	Feb. 14, 1918		High line feeder, schedule 1, item 1	Cubic yard	1,900	$0.35	(1)	$0.35
Do	do		High line feeder, schedule 2, item 1	do	1,200	.42	$0.57	.42
Do	Apr. 27, 1918		McClanahan lateral, schedule 4, item 1	do	5,950	.38	.39	.38
Do	do		McClanahan lateral, schedule 5, item 1	do	4,100	.38	.39	.38
Do	May 10, 1918		McClanahan lateral, schedule 6, item 1	do	3,800	.38	.38	.38
Do	do		McClanahan lateral, schedule 7, item 1	do	3,700	.39	.40	.39
Do	May 24, 1918		McClanahan lateral, schedule 8, item 1	do	2,200	.25	.38	.25
Do	do		McClanahan lateral, schedule 9, item 1	do	1,610	.43	.45	.51
Montana, Flathead (Indian)	July 18, 1917	368	Mapleton lateral	do	11,700	.25		.25
Montana, Sun River	Aug. 29, 1917	18-1	Greenfields division, first unit, laterals and cross drainage culverts, schedule 1.	do	5,900	.25	.26	.25
Do	do	18-1	Greenfields division, first unit, laterals and cross drainage culverts, schedule 2.	do	5,550	.25	.26	.25
Do	do	18-1	Greenfields division, first unit, laterals and cross drainage culverts, schedule 3.	do	4,400	.50	.55	Rejected.
New Mexico-Texas, Rio Grande	Oct. 15, 1917	371	Juan de Herrera lateral, station 2 to 44	do	17,890	.185	.25	.185
Do	Nov. 15, 1917	372	Garfield Canal, station 692 to 748	do	22,000	.22	(1)	.22
Do	Dec. 15, 1917		Hatch Canal, schedule 1	do	12,000	.33	.375	.375
Do	do	(2)	Hatch Canal, schedule 2	do	15,000	.25	.26	.26
Do	do	(2)	Hatch Canal, schedule 3	do	12,000	.23	.27	.23
Do	do	(2)	Hatch Canal, schedule 4	do	12,600	.16	.22	.22
Do	do	(2)	Hatch Canal, schedule 5	do	14,000	.16	.22	.22
Do	do	(2)	Hatch Canal, schedule 6	do	15,500	.17	.23	.17
Do	do	(2)	Hatch Canal, schedule 7	do	15,000	.18	.24	.18
Do	do	(2)	Hatch Canal, schedule 8	do	14,500	.18	.20	.18
Do	do	(2)	Hatch Canal, schedule 9	do	14,000	.19	.20	.19
Do	do	(2)	Hatch Canal, schedule 10	do	14,000	.20	.23	.23
Do	do	(2)	Hatch Canal, schedule 11	do	16,000	.20	.23	.23
Do	Dec. 14, 1917	(2)	Juan de Herrera lateral, station 44 to 374, schedule 1.	do	15,500	.18	.22	.18
Do	do	(2)	Juan de Herrera lateral, station 44 to 374, schedule 2.	do	15,600	.18	.215	.18
Do	do	(2)	Juan de Herrera lateral, station 44 to 374, schedule 3.	do	14,200	.18	.23	.18
Do	do	(2)	Juan de Herrera lateral, station 44 to 374, schedule 4.	do	15,600	.18	.22	.18
Do	do	(2)	Juan de Herrera lateral, station 44 to 374, schedule 5.	do	14,800	.18	.225	.18
Do	do	(2)	Juan de Herrera lateral, station 44 to 374, schedule 6.	do	15,700	.18	.225	.18
Do	Feb. 8, 1918	366	Garfield Canal, schedules 1 to 8, inclusive	do	140,000	.189	.2375	.2375
Do	Feb. 19, 1918	(2)	Montoya main lateral, head gates to station 60	do	18,750	.19	(1)	.19
Do	Mar. 5, 1918	(2)	Montoya main lateral, station 60 to 190	do	14,960	.20	.30	.20
Do	Mar. 13, 1918	(2)	Montoya main lateral, station 190 to 315	do	14,570	.26	(1)	Rejected.
Do	Mar. 22, 1918	(2)	Montoya unit lateral system, branch A	do	10,200	.20	.26	.20
Do	Apr. 1, 1918	(2)	Montoya unit lateral system	do	15,830	.24	.25	.24
Do	Apr. 8, 1918		Montoya unit lateral system, branches B, C, and C'.	do	500,000	.106	.145	.105

[1] Only one bid.

[2] Specification issued from project office.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 1—Continued.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
New Mexico-Texas, Rio Grande	Apr. 15, 1918	(1)	Leasburg drain	Cubic yard	$14,570	$0.2175	$0.25	$0.217
Do	May 20, 1918	(1)	Salitral Canal, station 0 to 86-50	do	2,500	.225	(2)	.225
Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 1	do	222,000	.18	.20	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 2	do	262,000	.20	(2)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 3	do	376,000	.20	(2)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 4	do	283,000	.20	(2)	Rejected.
Do	Dec. 17, 1917	374	Fort Laramie Canal, division 7, schedule 1	do	222,000	.19	.21	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 2	do	262,000	.19	.21	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 3	do	376,000	.19	.23	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 4	do	283,000	.19	.23	Rejected.
Do	Dec. 18, 1917	373	Cherry Creek lateral, Fort Laramie unit, division 1, schedule 1.	do	57,000	.1545	.17½	.17½
Do	do	373	Cherry Creek lateral, Fort Laramie unit, division 1, schedule 2.	do	48,000	.175	.185	.175
Do	do	373	Cherry Creek lateral, Fort Laramie unit, division 1, schedule 3.	do	45,000	.1695	.175	.175
Do	do	373	Cherry Creek lateral, Fort Laramie unit, division 1, schedule 4.	do	49,000	.175	.185	.175
Do	do	373	Cherry Creek lateral, Fort Laramie unit, division 1, schedule 5.	do	30,000	.175	.18	.175
Do	Apr. 16, 1918	377	Fort Laramie Canal, division 7, core banks, schedule 1.	do	72,000	.19	.21	.19
Do	do	377	Fort Laramie Canal, division 7, core banks, schedule 2.	do	77,000	.20	.21	.21
Do	do	377	Fort Laramie Canal, division 7, core banks, schedule 3.	do	140,000	.20	.21	.20
Do	do	377	Fort Laramie Canal, division 7, core banks, schedule 4.	do	58,000	.20	.21	.20

EXCAVATION, CLASS 2.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Lowest.	Next.	Contract price.
Colorado, Uncompahgre Valley	Feb. 14, 1918		High line feeder, schedule 1, item 2	Cubic yard	75	$0.35	(2)	$0.35
Do	do		High line feeder, schedule 2, item 2	do	40	.42	$0.57	.42
Do	Apr. 27, 1918		McClanahan lateral, schedule 4, item 2	do	750	.38	.39	.38
Do	do		McClanahan lateral, schedule 5, item 2	do	1,300	.38	.39	.38
Do	May 10, 1918		McClanahan lateral, schedule 6, item 2	do	800	.38	.38	.38
Do	do		McClanahan lateral, schedule 7, item 2	do	1,100	.39	.40	.39
Do	May 24, 1918		McClanahan lateral, schedule 8, item 2	do	1,600	.38	.40	.50

Do	do		McClanahan lateral, schedule 9, item 2	do	1,000	.43	.45	.51
Montana, Flathead (Indian)	July 18, 1917	368	MA lateral	do	3,000	.80		.80
Montana, Sun River	Aug. 29, 1917	18-1	Greenfields division, first unit, laterals and cross drainage culverts, schedule 1.	do	100	.50	.55	.50
Do	do	18-1	Greenfields division, first unit, laterals and cross drainage culverts, schedule 2.	do	620	.50	.55	.50
Do	do	18-1	Greenfields division, first unit, laterals and cross drainage culverts, schedule 3.	do	1,100	.50	.60	Rejected.
Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 1	do	17,000	.40	.40	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 2	do	20,000	.40	(2)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 3	do	10,000	.40	(2)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 4	do	36,000	.40	(2)	Rejected.
Do	Dec. 17, 1917	374	Fort Laramie Canal, division 7, schedule 1	do	17,000	.28	.50	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 2	do	20,000	.26	.50	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 3	do	10,000	.28	.50	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 4	do	1,000	.28	.50	Rejected.
Do	Dec. 18, 1917	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 1.	do	500	.50	.65	.50
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 2.	do	500	.50	.75	.50
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 3.	do	500	.50	.75	.50
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 4.	do	5,000	.50	.75	.50
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 5.	do	500	.50	.75	.50

EXCAVATION, CLASS 3.

Colorado, Uncompahgre Valley	Feb. 14, 1918		High line feeder, schedule 1, item 3	Cubic yard	25	$0.35	(2)	$0.35
Do	do		High line feeder, schedule 2, item 3	do	10	.42	$0.57	.42
Do	Apr. 27, 1918		McClanahan lateral, schedule 4, item 3	do	100	.38	.39	.38
Do	do		McClanahan lateral, schedule 5, item 3	do	500	.38	.39	.38
Do	May 10, 1918		McClanahan lateral, schedule 6, item 3	do	200	.38	.38	.38
Do	do		McClanahan lateral, schedule 7, item 3	do	300	.39	.40	.39
Do	May 24, 1918		McClanahan lateral, schedule 8, item 3	do	1,200	1.20	1.50	1.20
Do	do		McClanahan lateral, schedule 9, item 3	do	640	.51	1.50	.51
Montana, Flathead (Indian)	July 18, 1917	368	MA lateral	do	4,450	2.30		2.30
Montana, Sun River	Aug. 29, 1917	18-1	Greenfields division, first unit, laterals and cross drainage culverts, schedule 1.	do	5	1.25	1.30	1.25
Do	do	18-1	Greenfields division, first unit, laterals and cross drainage culverts, schedule 2.	do	10	1.25	1.30	1.25
Do	do	18-1	Greenfields division, first unit, laterals and cross drainage culverts, schedule 3.	do	15	1.25	1.30	Rejected.
Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 1	do	9,000	.70	.80	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 2	do	10,000	.80	(2)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 3	do	1,000	.80	(2)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 4	do	1,000	.80	(2)	Rejected.

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[1] Specifications issued from project office.

[2] Only one bid received.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 3—Continued.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Nebraska-Wyoming, North Platte	Dec. 17, 1917	374	Fort Laramie Canal, division 7, schedule 1	Cubic yard	$9,000	$0.45	$1.00	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 2	do	10,000	.45	1.00	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 3	do	1,000	.45	1.00	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 4	do	1,000	.45	1.00	Rejected.
Do	Dec. 18, 1917	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 1.	do	100	.80	1.00	.80
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 2.	do	100	.80	1.00	.80
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 3.	do	200	.80	1.00	.80
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 4.	do	100	.80	1.00	.80
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 5.	do	200	.80	1.00	.80

EXCAVATION, STRUCTURES.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Nebraska-Wyoming North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 5, class 1.	Cubic yard	26,700	$0.60	(1)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 5, class 2.	do	100	.75	(1)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 5, class 3.	do	100	1.50	(1)	Rejected.

FLUME MATERIAL.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
New Mexico-Texas, Rio Grande	July 23, 1917	96-D	Flume material No. 48	Linear feet	1,000	$0.8013	(2)	$0.8013
Do	do	96-D	Flume material No. 60	do	2,500	1.18	(2)	1.18
Do	do	96-D	Flume material No. 72	do	2,000	1.40	(2)	1.40
Do	do	96-D	Flume material No. 84	do	1,500	1.60	(2)	1.60
Do	do	96-D	Flume material No. 132	do	60	3.55	(2)	3.55
Do	do	96-D	Flume material No. 96	do	214	1.91	(2)	1.91

GATES, METAL, FURNISHING.

New Mexico, Carlsbad	Jan. 31, 1918	134-D	Headgates, laterals	Job	50	[3] $398.61	[3] $574.88	....

GATES, SHERBURNE LAKES DAM.

Montana, Milk River, St. Mary Storage.	Nov. 5, 1915	F-9	Pistons and piston rods for operating mechanism for slide gates, Sherburne Lakes Dam.	Set	1 set of 6	....	....	$170.00

GATES, WITH GUIDES, STANDS, ETC., INSTALLING.

Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 5, 4 by 5 gates.	Per gate	5	$75.00	(1)	Rejected.

OVERHAUL.

Montana, Flathead (Indian)	July 18, 1918	368	MA lateral	Station yard	500	(4)	(4)	$0.02
Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 1	do	113,000	(4)	(4)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 2	do	120,000	(4)	(4)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 3	do	400,000	(4)	(4)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 4	do	125,000	(4)	(4)	Rejected.
Do	Dec. 17, 1917	374	Fort Laramie Canal, division 7, schedule 1	do	113,000	(4)	(4)	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 2	do	120,000	(4)	(4)	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 3	do	400,000	(4)	(4)	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 4	do	125,000	(4)	(4)	Rejected.
Do	Dec. 18, 1917	373	Cherry Creek lateral, Fort Laramie unit laterals, division 1, schedule 1.	do	11,000	(4)	(4)	.02
Do	do	373	Cherry Creek lateral, Fort Laramie unit laterals, division 1, schedule 2.	do	18,000	(4)	(4)	.02
Do	do	373	Cherry Creek lateral, Fort Laramie unit laterals, division 1, schedule 3.	do	11,000	(4)	(4)	.02
Do	do	373	Cherry Creek lateral, Fort Laramie unit laterals, division 1, schedule 4.	do	4,000	(4)	(4)	.02
Do	do	373	Cherry Creek lateral, Fort Laramie unit laterals, division 1, schedule 5.	do	6,000	(4)	(4)	.02
Do	Apr. 16, 1918	377	Fort Laramie Canal, division 7, core banks, schedule 1.	do	100,000	(4)	(4)	.02
Do	do	377	Fort Laramie Canal, division 7, core banks, schedule 2.	do	96,000	(4)	(4)	.02

[1] Only one bid.

[2] Information not available in project office.

[3] Freight included.

[4] Price fixed in schedule.

Unit bids and contract prices on formal specifications—Continued.

EXCAVATION, CLASS 3—Continued.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Nebraska-Wyoming, North Platte	Dec. 17, 1917	374	Fort Laramie Canal, division 7, schedule 1	Cubic yard	$9,000	$0.45	$1.00	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 2	do	10,000	.45	1.00	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 3	do	1,000	.45	1.00	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 4	do	1,000	.45	1.00	Rejected.
Do	Dec. 18, 1917	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 1.	do	100	.80	1.00	.80
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 2.	do	100	.80	1.00	.80
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 3.	do	200	.80	1.00	.80
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 4.	do	100	.80	1.00	.80
Do	do	373	Cherry Creek lateral, Fort Laramie unit lateral, division 1, schedule 5.	do	200	.80	1.00	.80

EXCAVATION, STRUCTURES.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Lowest.	Next.	Contract price.
Nebraska-Wyoming North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 5, class 1.	Cubic yard	26,700	$0.60	(1)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 5, class 2.	do	100	.75	(1)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 5, class 3.	do	100	1.50	(1)	Rejected.

FLUME MATERIAL.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Lowest.	Next.	Contract price.
New Mexico-Texas, Rio Grande	July 23, 1917	96-D	Flume material No. 48	Linear feet	1,000	$0.8013	(2)	$0.8013
Do	do	96-D	Flume material No. 60	do	2,500	1.18	(2)	1.18
Do	do	96-D	Flume material No. 72	do	2,000	1.40	(2)	1.40
Do	do	96-D	Flume material No. 84	do	1,500	1.60	(2)	1.60
Do	do	96-D	Flume material No. 132	do	60	3.55	(2)	3.55
Do	do	96-D	Flume material No. 96	do	214	1.91	(2)	1.91

GATES, METAL, FURNISHING.

New Mexico, Carlsbad	Jan. 31, 1918	134-D	Headgates, laterals	Job	50	[3] $398.61	[3] $574.88	....

GATES, SHERBURNE LAKES DAM.

Montana, Milk River, St. Mary Storage.	Nov. 5, 1915	F-9	Pistons and piston rods for operating mechanism for slide gates, Sherburne Lakes Dam.	Set	1 set of 6	....	....	$170.00

GATES, WITH GUIDES, STANDS, ETC., INSTALLING.

Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 5, 4 by 5 gates.	Per gate	5	$75.00	(1)	Rejected.

OVERHAUL.

Montana, Flathead (Indian)	July 18, 1918	368	MA lateral	Station yard	500	(4)	(4)	$0.02
Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 1	do	113,000	(4)	(4)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 2	do	120,000	(4)	(4)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 3	do	400,000	(4)	(4)	Rejected.
Do	do	369	Fort Laramie Canal, division 7, schedule 4	do	125,000	(4)	(4)	Rejected.
Do	Dec. 17, 1917	374	Fort Laramie Canal, division 7, schedule 1	do	113,000	(4)	(4)	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 2	do	120,000	(4)	(4)	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 3	do	400,000	(4)	(4)	Rejected.
Do	do	374	Fort Laramie Canal, division 7, schedule 4	do	125,000	(4)	(4)	Rejected.
Do	Dec. 18, 1917	373	Cherry Creek lateral, Fort Laramie unit laterals, division 1, schedule 1.	do	11,000	(4)	(4)	.02
Do	do	373	Cherry Creek lateral, Fort Laramie unit laterals, division 1, schedule 2.	do	18,000	(4)	(4)	.02
Do	do	373	Cherry Creek lateral, Fort Laramie unit laterals, division 1, schedule 3.	do	11,000	(4)	(4)	.02
Do	do	373	Cherry Creek lateral, Fort Laramie unit laterals, division 1, schedule 4.	do	4,000	(4)	(4)	.02
Do	do	373	Cherry Creek lateral, Fort Laramie unit laterals, division 1, schedule 5.	do	6,000	(4)	(4)	.02
Do	Apr. 16, 1918	377	Fort Laramie Canal, division 7, core banks, schedule 1.	do	100,000	(4)	(4)	.02
Do	do	377	Fort Laramie Canal, division 7, core banks, schedule 2.	do	96,000	(4)	(4)	.02

[1] Only one bid.
[2] Information not available in project office.
[3] Freight included.
[4] Price fixed in schedule.

Unit bids and contract prices on formal specifications—Continued.

OVERHAUL—Continued.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Bids per unit.		Contract price.
						Lowest.	Next.	
Nebraska-Wyoming, North Platte	Apr. 16, 1918	377	Fort Laramie Canal, division 7, core banks, schedule 3.	Cubic yard	$252,000	(1)	(1)	$0.02
Do	do	377	Fort Laramie Canal, division 7, core banks, schedule 4.	do	90,000	(1)	(1)	.02
New Mexico-Texas, Rio Grande	Feb. 8, 1918	366 rev.	Earthwork, Garfield Canal	do	50,000	$0.02	[2] $0.02	.02
Do	Nov. 15, 1917	372	do	do	2,000	.0175	(1)	.0175
Do	Dec. 15, 1917	1-RG	Earthwork, Hatch Canal	do	11,000	.015	.02	.02
Do	Oct. 15, 1917	2-RG	Earthwork, Juan d' Herrera	do	430,000	.0125	.013	.0125

PAVING, GROUTED.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Lowest.	Next.	Contract price.
Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 5, 12 inches.	Square yard	2,500	$6.00	(3)	Rejected.

PIPE, WOODSTAVE, FURNISHED AND ERECTED.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Lowest.	Next.	Contract price.
Montana, Huntley	Feb. 1, 1918	133-D	Auxiliary pumping plant:					
			42-inch fir, painted staves	Linear foot	1,200	$2.11		$2.11
			Bands	Each	2,000	.76		.76
Nebraska-Wyoming, North Platte	May 13, 1918	152-D	Penstock, Lingle power plant, 54-inch redwood, 835 linear feet.	Lump sum		5,577.00		5,577.00

STEEL, REINFORCING, PLACING.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Lowest.	Next.	Contract price.
Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 5	Pound	328,000	$0.03	(3)	Rejected.

STEEL, STRUCTURAL, ERECTING.

State and project.	Date opening bids.	Specification No.	Feature or description.	Unit.	Quantity.	Lowest.	Next.	Contract price.
Nebraska-Wyoming, North Platte	Sept. 5, 1917	369	Fort Laramie Canal, division 7, schedule 5	Pound	8,000	$0.06	(3)	Rejected.

STRUCTURES.

Montana, Milk River	Oct. 15, 1917	370	Movable crest, bridge and hoist cars:					
			Schedule 1; movable crest and service bridge, item 1.	Complete	1	$15,500.00	$21,240.00	$15,500.00
			Schedule 1, item 2	do	1	3,000.00	4,200.00	3,000.00
			Schedule 2, hoist cars, item 1	do	2	1,600.00	4,996.00	1,600.00

TELEPHONE LINES.

Montana, Milk River	June 10, 1918	153-D; read. 147-D	Erecting telephone line:					
			Schedule 1—					
			Erecting telephone line	Mile	20	$78.50	$118.00	$78.50
			Constructing booths	Each	7	8.00	18.00	8.00
			Installing instruments	do	9	3.00	15.00	3.00
			Schedule 2—					
			Erecting telephone line	Mile	13	78.50	118.00	78.50
			Constructing booths	Each	7	8.00	18.00	8.00
			Installing instruments	do	8	3.00	15.00	3.00

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[1] Price fixed in schedule.

[2] Only one bid received.

ENGINEERING DATA FOR PROJECTS ON COMPLETION.

[The following tables of data for projects on completion, covering reservoirs, storage dams, diversion dams, canals, tunnels, and irrigable area, are necessarily subject to some revision as the projects develop and more detailed plans are prepared. In so far as they refer to works yet to be built or areas not yet covered by canal, they are not to be taken as guaranteeing that such work will ever be done. All future work depends on appropriations therefor by Congress.]

Engineering data for projects when completed.

RESERVOIRS.

Projects.	Name.	Area.	Capacity.	Spillways.			
				Length.	Elevation above stream bed.	Capacity.	
						Normal.	Maximum.
		Acres.	*Acre-feet.*	*Feet.*	*Feet.*	*Sec.-ft.*	*Sec.-ft.*
Arizona: Salt River	Roosevelt	16,832	1,365,000	420	225	....	....
California: Orland	East Park	1,850	51,000	415	88	8,000	12,000
Colorado: Uncompahgre Valley.	Taylor Park	2,260	106,000	(1)	(1)	(1)	(1)
Idaho:							
Boise	Deer Flat	9,835	177,000	None.	....	....	....
Do	Arrowrock	2,860	280,000	402	247	15,000	40,000
Minidoka	Lake Walcott	11,350	[2] 150,000	2,385	42	40,000	60,000
Do	Jackson Lake	25,530	789,000	160	41	7,500	13,000
Montana:							
Milk River	St. Mary Lakes	6,910	124,000	500	20	[3] 500	20,000
Do	Sherburne Lakes	2,000	78,000	200	70	[3] 200	8,000
Do	Nelson Reservoir	6,020	132,000	(4)	[4] 35	....	....
Do	Point of Rocks	180	830	740	8	[3] 0	700
Do	Beaver Creek	5,800	60,000	(1)	39	[3] 100	5,000
Sun River	Willow Creek	2,696	86,000	200	100	725	(1)
Do	Sun River Storage	3,540	269,000	580	321	14,000	46,000
Do	Pishkun Reservoir	1,542	45,700	Under	control.	....	....
Do	Muddy Creek	1,828	33,000	....	80	284	(1)
Do	Benton Lake	9,300	144,000	Under	control.	....	....
Nebraska-Wyoming: North Platte.	Pathfinder	22,700	1,070,000	605	184	40,000	....
Do	Lake Alice	900	11,400	100	18	2,500	....
Do	Lake Minatare	2,240	67,000	100	55	2,000	....
Do	Winters Creek Lake	360	3,000	None.	....	....	....
Nevada: Truckee-Carson:	Lake Tahoe	120,000	120,000	85	6	....	....
Do	Alkali Flat	8,500	88,000	(1)	(1)	....	....
Do	Lahontan	12,000	290,000	500	112	....	30,000
New Mexico: Carlsbad	Avalon	970	6,200	1,026	21	86,000	....
Do	McMillan	7,860	51,500	1,750	26.1-24.9	17,000	34,500
New Mexico-Texas: Rio Grande.	Elephant Butte	40,080	2,638,000	275	193	8,000	16,000
Oregon: Umatilla	Cold Springs	1,500	50,000	330	90	6,000	6,000
Oregon-California: Klamath.	Upper Klamath Lake	60,000	264,000	None.	....	....	....
Do	Clear Lake	25,000	462,000	357	24	10,000	30,000
South Dakota: Belle Fourche.	Belle Fourche	8,010	203,000	314	100	2,000	2,000
Do	Nine Mile	150	2,500	20	20	(1)	(1)
Utah: Strawberry Valley	Strawberry Valley	8,370	250,000	58	61	500	2,000
Washington:							
Okanogan	Salmon Lake	200	3,200	None.	....	....	....
Do	Conconully	460	13,000	180	55	4,500	16,000
Yakima	Bumping Lake	1,350	34,000	235	36	....	6,000
Do	Lake Clealum	4,680	501,000	420	112	....	18,000
Do	Lake Kachess	4,800	210,000	250	53	....	7,200
Do	Tieton (McAllister Meadows).	1,800	185,000	350	183	....	19,000
Do	Lake Keechelus	2,550	152,000	300	60	....	10,000
Do	Clear Creek	126	1,700	210	85	....	....
Wyoming: Shoshone	Shoshone	6,600	456,600	300	233	11,000	30,000
Do	Ralston	200	2,100	....	....	....	....
INDIAN PROJECTS.							
Montana:							
Blackfeet	Two Medicine Lake	854	16,000	66	25½	[3] 250	6,000
Do	Spring Lake	1,400	29,000	50	45	[3] 0	900
Do	Four Horns	1,867	60,640	50	57	[3] 0	1,000
Do	Guardipee	1,110	22,600	170	[5] 40	[3] 0	840
Flathead	Big Draw	901	9,330	100	25	200	500
Do	Dog Lake	160	3,200	....	[4] 30	....	....
Do	Dry Fork	250	2,000	250	25	500	1,500

[1] Undetermined.

[2] 53,500 acre-feet only available; above fixed crest of spillway.

[3] Average flow of stream on which reservoir is located.

[4] No spillways: drainage limited; elevation is that of water surface.

[5] Elevation above outlet.

Engineering data for projects when completed—Continued.

RESERVOIRS—Continued.

Projects.	Name.	Area.	Capacity.	Spillways.			
				Length.	Elevation above stream bed.	Capacity.	
						Normal.	Maximum.
INDIAN PROJECTS—contd.							
Montana—Continued.		*Acres.*	*Acre-feet.*	*Feet.*	*Feet.*	*Sec.-ft.*	*Sec.-ft.*
Flathead	Flathead Lake	107,000	1,800,000	1,000	180	100,000	150,000
Do	Horte	73	260	40	17	140	300
Do	Hubbart	400	15,000	50	120	400	1,200
Do	Kickinghorse	675	6,800		[1] 23		
Do	Little Bitter Root Lake	3,000	9,000		[1] 3		
Do	Lower Crow Creek	300	9,485	100	82	600	1,500
Do	McConnell	100	2,000		[1] 40		
Do	McDonald Lake	220	10,600	200	51	3,000	6,000
Do	Mission	300	8,300	100	74	1,200	3,000
Do	Ninepipe	1,630	15,100		[1] 30		
Do	Pablo	2,100	29,600		[1] 36		
Do	Polson	70	1,700		[1] 80		
Do	Tabor (St. Mary Lake)	300	25,000	50	52	400	1,200
Do	Twin	70	937		[1] 25		
Fort Peck	Little Porcupine	390	3,900				
Do	Big Porcupine	750	9,400	(2)			
Do	Poplar River	3,700	50,000	(2)			
Do	Wolf Creek	350	4,550	(2)			
Do	Smoke Creek	300	5,300	(2)			
Total		580,009	13,175,432				

STORAGE DAMS.

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume.
			Feet.	*Feet.*	*Cubic yds.*
Arizona: Salt River.	Roosevelt [3]	Rubble masonry arch, gravity.	280	1,125	342,325
California: Orland	East Park [3]	Concrete arch, gravity	139	250	12,200
Colorado: Uncompahgre Valley.	Taylor Park	Undetermined	(4)	(4)	(4)
Idaho:					
Boise	Upper Deer Flat	Earth fill	70	4,000	1,190,275
Do	Lower Deer Flat [3]	do	40	7,200	1,207,606
Do	Deer Flat Forest	do	16	950	22,500
Do	Arrowrock [3]	Rubble concrete arch, gravity.	349	1,100	585,130
Minidoka	Minidoka [3]	Rock fill, concrete core	86	937	242,500
Do	Jackson Lake [6]	Massive concrete gate section and earth fill.	67	4,450	345,400
Montana:					
Milk River	St. Marys Lake	Earth embankment	30	2,000	135,000
Do	Sherburne Lakes [5]	do	78	2,000	215,000
Do	Nelson Reservoir [6]	do	39	20,730	1,016,000
Do	Point of Rocks [3]	do	12.5	2,680	31,000
Do	Beaver Creek	do	49	8,000	500,000
Sun River	Willow Creek [7]	Earth fill	110	1,045	452,000
Do	Sun River Storage	Masonry	329	989	296,050
Do	Pishkun	Earth fill	48	8,600	444,000
Do	Muddy Creek	do	90	800	440,000
Do	Benton Lake	do	40	240	12,000
Nebraska-Wyoming: North Platte.	Pathfinder [3]	Broken range masonry arch.	218	432	60,210
Do	Pathfinder Dike [3]	Earth fill	40	1,650	152,000
Do	Dam No. 1 [3]	do	30	3,100	240,000
Do	Dam No. 1½ [3]	do	23	2,550	119,600
Do	Minatare [3]	do	65	3,700	570,000

[1] No spillways; drainage limited; elevation is that of water surface.

[2] Undertermined.

[3] Completed.

[4] Not designed.

[5] Under construction.

[6] Completed to height of 11 feet, with storage of 25,000 acre-feet.

[7] Completed to height of 70 feet.

Engineering data for projects when completed—Continued.

STORAGE DAMS—Continued.

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume.
			Feet.	*Feet.*	*Cubic yds.*
Nevada: Truckee-Carson.	Lake Tahoe [1]	Concrete sluiceway regulator.	14	109	425
Do	Alkali Flat	Not designed			
Do	Lahontan [1]	Earth and gravel fill with concrete spillways.	124	1,400	770,000
New Mexico:					
Carlsbad	Avalon [1]	Earth and rock fill, concrete core.	50	1,380	168,773
Do	McMillan [1]	Earth and rock fill	55	2,070	150,744
New Mexico-Texas: Rio Grande.	Elephant Butte [1]	Rubble concrete, gravity, straight structure.	318	[2] 1,674	[3] 605,200
Do	Elephant Butte Dike [1]	Earth fill	42	1,900	164,650
Oregon: Umatilla	Cold Springs [1]	do	98	3,800	789,500
Oregon - California: Klamath.	Clear Lake [1]	Rock fill	33	790	56,600
South Dakota: Belle Fourche.	Belle Fourche [1]	Earth fill	115	6,200	1,600,000
Do	Nine Mile	do	28	1,400	50,800
Utah: Strawberry Valley.	Indian Creek Dike [1]	Earth fill, reinforced concrete	37	1,311	101,107
Do	Strawberry Dam [1]	Earth fill, reinforced concrete core wall.	72	488	108,415
Washington:					
Okanogan	Salmon Lake [1]	Concrete headworks			
Do	Conconully [1]	Hydraulic earth fill	64	1,000	336,000
Yakima	Bumping Lake [1]	Earth fill	45	3,425	247,700
Do	Lake Clealum	Earth and gravel fill	125	700	462,000
Do	Lake Kachels [1]	do	63	1,400	193,300
Do	Tieton [4]	Earth and rock fill	220	900	1,785,000
Do	Lake Keechelus [1]	Earth and gravel fill	70	6,500	639,000
Do	Clear Creek [5]	Single concrete arch	84	404	4,100
Wyoming: Shoshone.	Shoshone [1]	Rubble concrete arch	328	200	78,576
Do	Ralston [1]	Earth fill	50	150	24,740
INDIAN PROJECTS.					
Montana:					
Blackfeet	Two Medicine [1]	Earth embankment	36	900	28,600
Do	Spring Lake	do	50	1,500	75,000
Do	Four Horns [6]	do	62	2,225	149,000
Do	Guardipee	do	50	613	45,000
Flathead	Big Draw	Earth	35	3,600	137,000
Do	Dog Lake	Loose rock and earth	35	2,250	67,000
Do	Dry Fork	Earth	33	1,860	130,000
Do	Newell	Concrete	170	850	100,000
Do	Horte [1]	Earth fill	16	930	3,800
Do	Hubbart	Loose rock and earth	118	450	302,000
Do	Kickinghorse	Earth	31	3,700	181,000
Do	Little Bitter Root	do	10	300	4,000
Do	Lower Crow Creek	do	92	860	330,000
Do	McConnell	do	45	1,130	71,000
Do	McDonald Lake	Loose rock and earth	57	1,500	214,000
Do	Mission	do	80	2,500	346,000
Do	Ninepipe [7]	Earth	38	2,180	162,000
Do	Pablo [8]	do	46	14,000	1,028,000
Do	Polson	do	85	1,100	170,000
Do	Tabor	Loose rock and earth	58	2,200	140,000
Do	Twin	Earth	30	1,600	46,000
Fort Peck	Little Porcupine [1]	Earth fill	17	4,200	43,400
Do	Big Porcupine	do	30	1,500	118,000
Do	Poplar River	do	51	5,200	960,000
Do	Wolf Creek	do	36		85,300
Do	Smoke Creek	do	48		76,000
Total					21,978,926

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[1] Completed.
[2] Including spillway.
[3] Including spillway, 611,000 cubic yards.
[4] Under construction.
[5] In process of being raised 21 feet.
[6] First development, 16,000; completed for 4,000 acre-feet.
[7] First development, 64,191; completed for 5,000 acre-feet.
[8] First development, 153,750; completed for 5,000 acre-feet when paved; now paved for 3,000 acre-feet.

Engineering data for projects when completed—Continued.

DIVERSION DAMS.

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume.
			Feet.	*Feet.*	*Cubic yds.*
Arizona: Salt River.	Granite Reef[1]	Rubble concrete weir	38	1,000	40,000
Do	Power Canal[1]	.....do	12¾	400	4,800
Do	Joint Head[1]	Concrete weir	10	600	1,740
Arizona-California: Yuma.	Laguna[1]	Indian weir, concrete and rock fill.[2]	40	4,780	441,732
California: Orland	South Canal[1]	Concrete on piling, with rock fill.	20	900	2,886
Do	North Side[1]	Concrete weir, with removable timber crest.	8	360	270
Do	East Park Feed Canal.[1]	Concrete arch	44	154	1,777
Colorado:					
Grand Valley	Grand River Diversion.[1]	Masonry ogee weir with roller crest 10 to 15 feet high.	24	546	25,682
Uncompahgre Valley.	Gunnison[1]	Crib on rock fill and movable flashboards.	15¾	237	3,200
Do	Montrose and Delta[1]	Movable flashboard weir	6.8	68½	....
Do	Loutsenhizer[1]	Pile and timber weir	....	100	....
Do	Selig[1]	Movable flashboard weir	6	95½	....
Do	Ironstone[1]	Pile foundation with deck and needle flashboards.	8½	58½	....
Do	East Canal[1]	Movable flashboard weir	(3)	144	....
Do	Garnet[1]	Rock basket and brush dam	....	....	....
Idaho:					
Boise	Boise River[1]	Rubble concrete weir	45	[4] 246	21,750
Minidoka	Minidoka[1]	Combined diversion and storage dam. (See Storage.)	....	....	....
Montana:					
Milk River	Swift Current[1]	Earth and timber crib	13	2,800	86,700
Do	St. Mary[1]	Concrete	6.5	198	480
Do	Chinook	Reinforced concrete	20	250	3,400
Do	Dodson[5]	Timber crib, rock filled	25	319	12,000
Do	Vandalia[1]	Reinforced concrete	34	1,500	11,000
Sun River	Sun River[1]	Concrete masonry	132	212	6,200
Do	Deep Creek	Reinforced concrete	12	100	500
Montana-North Dakota: Lower Yellowstone.	Lower Yellowstone[1]	Rock-filled, timber weir	12	700	14,500
Nebraska-Wyoming: North Platte	Whalen[1]	Concrete weir	29	300	80,740
Nevada: Truckee-Carson.	Truckee River[1]	16 concrete sluiceways	22	171	3,322
Do	Carson River[1]	23 concrete sluiceways	21	240	2,707
New Mexico: Carlsbad.	Avalon[1]	Combined storage and diversion. (See Storage.)	....	....	....
New Mexico-Texas: Rio Grande	Leasburg[1]	Rubble concrete weir	9	600	2,318
Do	Mesilla[1]	.....do.[6]	16.7	303	2,876
Do	Mexican[7]	Rubble masonry	4.7	320	....
Do	Palomas	Not designed	....	....	....
Do	Percha[1]	Rubble concrete	17	350	4,346
Oregon: Umatilla	Feed Canal (Echo)[1]	Concrete weir on timber crib.	2½	400	296
Do	Maxwell Canal[1]	.....do	2.3	175	43
Do	Three-Mile Falls[1]	Concrete multiple arch	24	800	4,160
Oregon-California: Klamath.	Lost River[1]	Hollow reinforced concrete	40	290	5,550
South Dakota: Belle Fourche.	Diversion[1]	Concrete weir	23	400	12,149
Utah: Strawberry Valley.	Spanish Fork[1]	.....do	16	70	1,262
Do	Indian Creek Crossing[1]	Earth	17	1,300	15,183
Do	Horse Creek Crossing[1]	.....do	6	500	7,376
Do	Diverting dam at Strawberry dam.[1]	.....do	6	100	1,146
Do	Diverting dam at rating flume.[1]	.....do	12	150	4,103
Washington:					
Okanagon	Salmon Creek[1]	Concrete weir	4½	50	132
Yakima	Sunnyside[1]	Concrete ogee weir	8½	500	2,291
Do	Tieton Diversion[1]	Concrete and rock-filled crib.	3	110	334
Wyoming: Shoshone	Corbett[1]	Reinforced-concrete weir	18	400	4,951

[1] Completed.
[2] Area formed by Laguna diversion dam, 6,400 acres.
[3] Two weirs, one 6 feet by 72 feet, the other 6 feet 10 inches by 72 feet.
[4] Length, including logway.
[5] Completed, except for installation of movable crest.
[6] With 6 foot 3 inch and 4 foot 6 inch tainter gate movable crest.
[7] Constructed by Mexican authorities and used jointly.

Engineering data for projects when completed—Continued.

DIVERSION DAMS—Continued.

Projects.	Name.	Type.	Maximum height.	Crest length.	Volume.
			Feet.	*Feet.*	*Cubic yds.*
Montana:					
Blackfeet	Two Medicine	Brush and rock	4	165	175
Do	Blacktail[1]	Concrete	14	54	290
Do	Badger Birch and Cut Bank.	Not yet designed			
Flathead	Jocko River	Log crib, rock filled[2]			
Do	Little Bitter Root	do			
Do	Camas A[1]	Arched masonry	25	125	500
Do	Mud Creek[1]	Concrete	12	18	116
Do	Crow Creek[1]	do	13	82	330
Do	Post Creek—Kicking-horse.[1]	Log crib, rock filled	7	110	1,500
Do	Post Creek—Pablo Feeder.	do.[2]			
Do	Mission Creek[1]	Log apron	3	80	
Do	Dry Creek	Log crib, rock filled[2]			
Do	Finley Creek	do			
Do	Agency Creek	do			
Do	Big Knife Creek[1]	Concrete	5	6	25
Do	Valley Creek	Log crib, rock filled[2]			
Do	Other small creeks	do			
Fort Peck	Little Porcupine[1]	Concrete weir on timber crib.	4	150	250
Do	Poplar River[1]	do	4	300	180
Do	Big Porcupine[1]	do	6	150	185
Total					837,453

CANALS.

Projects.	Principal canals.			Mileage, with capacity in second-feet.				
	Name.	Maximum capacity.	Length.	Over 800.	300–800.	50–300.	Less than 50.	Total.
		Sec.-ft.	*Miles.*					
Arizona: Salt River	Power[1]	225	19	32	71	78	566	747
Do	Arizona[1]	2,000	22					
Do	South[1]	1,200	2					
Do	Consolidated[1]	1,000	7½					
Arizona-Cal.: Yuma	Main[1]	1,700	12	17	12	100	430	559
Do	West Main	520	23					
Do	East Main	880	24½					
California: Orland	East Park Feed[1]	250	7			7		7
Do	North Main[1]	80	4.5			8	32	40
Do	South Main[1]	225	9.1			23	75	98
Colorado:								
Grand Valley	Main[1]	1,425	62	5	39	21	232	297
Uncompahgre	South[1]	1,300	12	12		1	50	63
Do	West[1]	120	22			14	27	41
Do	Montrose and Delta[1]	450	32		16	37	80	133
Do	Loutsenhizer[1]	125	15			8	22	30
Do	Selig[1]	300	20		4	17	70	91
Do	Ironstone[3]	350	12		5	13	50	68
Do	East[1]	325	11		4	10	50	64
Do	Garnet[1]	50	10			8	4	12
Idaho:								
Boise	Main South[1]	2,500	34	40	57	165	788	1,050
Do	Mora[1]	915	56					
Do	Deer Flat, Low Line[1]	780	37					
Minidoka	North Side[1]	1,500	8	25	30	95	483	633
Do	South Side[1]	1,000	13					
Montana:								
Huntley	Main[1]	500	32		10	22	200	232
Do	Pumping High Line[1]	100	12					
Milk River	St. Mary[1]	850	29	29				29
Do	Dodson South[1]	900	44	44		66	130	240
Do	Dodson North[1]	200	29			23	37	60

[1] Completed. [2] Not yet designed. [3] Under construction.

Engineering data for projects when completed—Continued.

CANALS—Continued.

Projects.	Principal canals.			Mileage, with capacity in second-feet.				
	Name.	Maximum capacity.	Length.	Over 800.	300–800.	50–300.	Less than 50.	Total.
Montana—Continued.		*Sec.-ft.*	*Miles.*					
Milk River	Vandalia South[1]	300	48	......	....	44	41	85
Do	Nelson Reservoir North.	250	45	......	....	40	30	70
Do	Nelson Reservoir South.[2]	260	27	......	....	26	59	85
Do	Chinook	350	80	......	30	50	90	170
Sun River	Fort Shaw[1]	175	12	......	....	18	103	121
Do	Pishkun[3]	2,500	12	12	....	....	....	12
Do	Sun River Slope[4]	1,000	25.4	25.4	....	74	286	404.3
Do	Greenfields	850	18.9	10.9	8			
Do	Other units	....	....	......	50	54	210	314
Montana-North Dakota: Lower Yellowstone.	Main[1]	830	66	......	49	19	190	258
Nebraska-Wyoming: North Platte.	Interstate[1]	1,400	95	90	20	92	603	805
Do	Fort Laramie	1,430	127	62	42	44	[5]600	748
Nevada: Truckee-Carson	Truckee[1]	1,500	31	42	62	80	511	695
Do	V Line[1]	1,500	8					
Do	L Line[1]	1,210	14.5					
Do	S Line[1]	1,210	18.7					
Do	D Line[1]	440	7					
Do	AA Line[1]	400	13.4					
Do	T Line[1]	400	9					
New Mexico:								
Carlsbad	Main[1]	450	[6]3	......	13	12	120	145
Texas, Rio Grande	Palomas	100	12	......	67.8	126.1	27	220.9
Do	Arrey[1]	350	30					
Do	Garfield[2]	330	9.3					
Do	Hatch[2]	200	8.0					
Do	Rincon	100	7.0					
Do	Leasburg[1]	485	10.8					
Do	Picacho Branch[7]	90	3.7					
Do	East Side[1]	240	10.3					
Do	West Side[1]	493	14.4					
Do	Chamberino Feed	70	2.2					
Do	Franklin[8]	450	31.4					
Do	San Elizario Feeder[1]	220	3.2					
Do	San Elizario main canal.[9]	270	3.5					
Do	Salatral[9]	177	1.6					
Do	Montoya[1]	54	3.1					
Do	Juan d'Herrera[8]	170	0.8					
Do	Island Feeder	125	2.1					
North Dakota: North Dakota Pumping.	Buford Trenton[1]	60	6	......	....	6	39	45
Do	Williston[1]	90	3	......	....	3	57	60
Oregon: Umatilla	Feed[1]	350	25	......	33	52	90	175
Do	West extension main	375	26.7					
Do	Maxwell	140	8					
Oregon-California: Klamath.	Main[1]	1,400	9	9	9	42	250	310
Do	Keno[1]	635	1					
Do	Lost River Diversion Channel.	250	8					
Do	East Branch[1]	260	4.5					
Do	South Branch[1]	205	13.2					
Do	Adams[1]	205	12					
Do	Griffith Lateral[1]	190	9					
South Dakota: Belle Fourche.	Inlet[1]	1,600	6½	7	55	105	146	627
Do	North Side[1]	700	45					
Do	South Side[1]	300	40					

[1] Completed.
[2] Under construction.
[3] Completed to first development capacity of 1,000 second-feet.
[4] Completed to first development capacity of 500 second-feet.
[5] Estimated.
[6] Main and southern canals, 31 miles.
[7] 2.3 miles constructed.
[8] Old canal purchased by U. S. Reclamation Service and reconstructed.
[9] Old canal purchased by U. S. Reclamation Service. Reconstruction under way.

Engineering data for projects when completed—Continued.

CANALS—Continued.

Projects.	Principal canals.			Mileage, with capacity in second-feet.				
	Name.	Maximum capacity.	Length.	Over 800.	300-800.	50-300.	Less than 50.	Total.
Utah:		*Sec.-ft.*	*Miles.*					
Strawberry Valley	Power[1]	500	3.3		3.3			3.3
Do	Trail Hollow[1]	125	4			4		4
Do	Indian Creek[1]	750	2		2			2
Do	High Line[1]	300	17.5			17.5		17.5
Do	Mapleton	100	6.75			6.75		6.7
Do	Lateral 3[1]	30	2.2				2.2	2.25
Do	Lateral 20[1]	55	6.1			1.1	5	6.1
Do	Lateral 30[1]	66	8.5			3.5	5	8.5
Do	Lateral 31[1]	10						
Do	Lateral 32[1]	50	2.9			0.8	2.1	2.9
Do	Lateral 33	150	2.2			2.2		2.2
Do	Lateral 34[1]	55	11.1			1.3	9.8	11.1
Do	Miscellaneous laterals and sublaterals.	12	31.4				31.4	31.4
Washington:								
Okanogan	Main[1]	110	2			10	69	79
Yakima	Sunnyside Main[1]	1,200	60	31	19	15	342	407
Do	Snipes Mountain[1]	160	13			10	42	52
Do	Rocky Ford[1]	100	13			1	29	30
Do	Manton[1]	110	14			8	44	52
Do	Benton Extension[1]	80	16			9	13	22
Do	Tieton[1]	300	12		12	32	291	335
Wyoming: Shoshone	Garland[1]	1,000	18	10.6	23.3	66.3	281	381.2
INDIAN PROJECTS.								
Montana:								
Blackfeet	Two Medicine	530	25		55	144	600	799
Do	Fisher	500	30					
Do	Birch	45	6					
Do	Cutbank North	250	30					
Do	Cutbank South	300	20					
Do	Four Horns Supply	275	12					
Flathead	Tabor Feeder	300	11		14	82	800	896
Do	Pablo Feeder	300	44					
Do	Kickinghorse Feeder[1]	400	4					
Do	Ninepipe Feeder	250	2					
Do	Pablo Lateral A[1]	400	17					
Do	Camas A	150	10					
Fort Peck	Little Porcupine[1]	250	1			1	13	14
Do	Poplar River B[1]	100	29			11	22	33
Do	Poplar River C[1]	100				18	48	66
Do	Big Porcupine[1]	100	7			7	25	32
Do	Missouri Gravity	625	100		10	30	60	100
Total				503.9	825.4	2,077.8	9,826.5	13,233.6

TUNNELS.

Projects.	Name.	Length.	Capacity.
Arizona: Salt River	Power Canal:[1]	*Feet.*	*Second-feet.*
	Intake	1,695	
	Lee	122	
	Wehrl cut-off—		
	No. 1	428	
	No. 2	129	
	No. 3	271	
	Wehrl	151	
	Pinto	999	
	Chilton	1,027	
	Robinson	152	
	Gray	761	
	Moffet	214	
	Grapevine	872	
	No. 6	206	
	No. 7	342	
	No. 8	553	
	No. 9	820	

[1] Completed.

Engineering data for projects when completed—Continued.

TUNNELS—Continued.

Projects.	Name.	Length.	Capacity.
Arizona: Salt River	Power Canal:	*Feet.*	*Second-feet.*
	No. 10	489	...
	No. 11	625	...
	No. 12	70	...
	No. 13	110	...
	Roosevelt: [1]		
	Sluicing	480	...
	Outlet	167	...
	Penstock	620	...
Arizona-California: Yuma	Colorado River siphon [1]	930	1,400
Colorado:			
Grand Valley	Main Canal:		
	No. 1 [1]	3,723	1,425
	No. 2 [1]	1,655	1,425
	No. 3 [1]	7,292	670
Uncompahgre	Gunnison [1]	30,645	1,000
	South Canal: [1]		
	No. 1	482	1,300
	No. 2	395	1,300
	No. 3	1,000	1,300
	No. 4	400	1,300
	No. 5	390	1,300
	West Canal [1]	1,750	100
	West Canal Extension [1]	800	30
	Lower Selig Extension: [1]		
	No. 1	160	140
	No. 2	360	140
	No. 3	100	100
	No. 4	310	100
Idaho: Boise	Penitentiary	322	10
	Arrowrock Logway [2]	159	...
Montana:			
Huntley	Main Canal:		
	No. 1 [1]	724	500
	No. 2 [1]	1,545	500
	No. 3 [1]	385	500
Sun River	Willow Creek [1]	639	725
	Sun River Storage	200	3,500
	Pishkun Canal:		
	No. 1 [3]	695	2,800
	No. 2 [3]	1,022	2,500
	No. 3 [3]	2,277	2,500
	Sun River Diversion Tunnel [1]	87	400
	Muddy Creek Reservoir	700	284
Nebraska-Wyoming: North Platte	Pathfinder: [1]		
	North [1]	480	6,000
	South [1]	360	6,400
	Drainage [1]	155	(4)
	Auxiliary [1]	209	(4)
	Crosscut [1]	55	(4)
	Fort Laramie Canal:		
	No. 1	2,700	1,420
	No. 2	2,150	1,420
	No. 3	3,700	360
Nevada: Truckee-Carson	Truckee Canal:		
	No. 1 [1]	901	1,200
	No. 2 [1]	309	1,200
	No. 3 [1]	1,515	1,200
	Gilpin Spillway [1]	115	1,200
New Mexico: Carlsbad	Spillway:		
	No. 1 [1]	97	3,000
	No. 2 [1]	103	3,000
Oregon: Umatilla	Spillway from Feed Canal [1]	34	450
Oregon-California: Klamath	Main Canal [1]	3,300	1,200
South Dakota: Belle Fourche	South Canal	1,306	350
Utah: Strawberry Valley	Strawberry [1]	19,897	600
	Strawberry Dam Sluicing	532	600
	Power Canal:		
	No. 1 [1]	800	500
	No. 2 [1]	705	500
	Highline No. 1 [1]	227	300
Washington:			
Okanogan	Conconully outlet [1]	395	900
Yakima, Tieton	Steeple, No. 1 [1]	55	350

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[1] Completed.

[2] Not intended to carry water, but for the purpose of running logs which are carried over the dam and brought down through a cableway chute which ends in this tunnel.

[3] Completed to first development capacity of 1,000 second-feet.

[4] Not designed for discharge.

Engineering data for projects when completed—Continued.

TUNNELS—Continued.

Projects.	Name.	Length.	Capacity.
		Feet.	*Second-feet.*
Washington—Continued.			
Yakima, Tieton	Steeple, No. 2[1]	48	350
	Trail Creek [1]	3,120	300
	Columnar [1]	1,200	300
	Tieton [1]	2,729	300
	North Fork [1]	3,811	300
Wyoming: Shoshone	Shoshone: [1]		
	Lower outlet	498	6,000
	Spillway	405	30,000
	Upper outlet	315	
	Corbett [1]	17,355	1,000
	Ralston Reservoir [1, 2]	245	
	Frannie [1]	1,330	317
	Shoshone Road: [1]		
	No. 1	39	
	No. 2	45	
	No. 3	14	
	No. 4	28	
	No. 5	136	
	No. 6	166	
	Highline Canal: [1]		
	No. 1	4,497	600
	No. 2	247	600
	No. 3	2,100	600
	No. 4	835	600
	No. 5	265	600
	No. 6	2,025	600
	No. 7	290	560
	No. 8	283	560
	No. 9	120	380
	No. 10	185	335
	Willwood:		
	No 1	560	300
	No. 2	365	300
INDIAN PROJECTS.			
Montana: Flathead	Newell [3]	1,800	2,500
	Tabor Reservoir Outlet	1,620	400
	Pablo 31A [1]	441	200
	Camas A	1,100	150
Fort Peck	Missouri River	4,300	625
Total		162,567	

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[1] Completed.

[2] Ralston Reservoir tunnel is a sluicing tunnel for the settling basin of Corbett Tunnel.

[3] 1,703 feet driven. Completed for first development (unlined).

IRRIGABLE AREA.

State, project, and unit.	Public land.			State land.	Indian land.	Private land.		Total.
	Entered.	Open.	Withdrawn.			Railroad.	Other.	
	Acres.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Arizona: Salt River	16,170			11,030			164,877	192,077
Gravity system								183,077
Pumping system								9,000
Arizona-California: Yuma	6,500		38,500	5,800	8,500		50,700	110,000
Arizona			38,500	5,800			50,700	95,000
California	6,500				8,500			15,000
Units—								
Yuma Valley (Ariz.)			6,900	3,100			45,000	55,000
Mesa pumping (Ariz.)			31,600	2,700			5,700	40,000
Reservation (Cal.)	6,500				8,500			15,000
California: Orland							20,533	20,533
North side							6,809	6,809
South side							13,404	13,404
Vested water rights							320	320
Colorado:								
Grand Valley	13,305	1,701	14,064				20,930	50,000
Gravity system	10,775	1,701	10,034				17,490	40,000
Pumping system	2,530		4,030				3,440	10,000
Uncompahgre Valley	19,157	3,100	1,772				75,971	100,000
South Canal system	2,560	480	13				6,323	9,376
West Canal system	2,506	29	14				4,025	6,574

Engineering data for projects when completed—Continued.

IRRIGABLE AREA—Continued.

State, project, and unit.	Public land.			State land.	Indian land.	Private land.		Total.
	Entered.	Open.	Withdrawn.			Railroad.	Other.	
Colorado—Continued.								
Uncompahgre Valley—Con.								
Montrose and Delta Canal system	*Acres.* 5,498	*Acres.* 372	*Acres.* 107	*Acres.*	*Acres.*	*Acres.*	*Acres.* 23,227	*Acres.* 29,204
Loutzenhizer Canal system	231	22	....	....	....	....	6,451	6,704
Selig Canal system	3,715	1,190	1,539	....	....	....	7,465	13,909
Ironstone Canal system	925	247	....	....	....	....	16,874	18,046
East Canal system	3,714	760	99	....	....	....	8,935	13,508
Garnet Canal system	8	....	....	....	....	....	2,671	2,679
Idaho: Boise	**67,452**	....	**3,160**	**3,350**	....	....	**253,758**	**327,720**
Present project lands, including vested water-right lands	67,452	....	....	350	....	....	206,418	274,220
Proposed extensions, including pumping	....	....	3,160	3,000	....	....	47,340	53,500
Idaho: King Hill	**9,026**	**371**	....	**1,071**	....	....	**5,908**	**16,376**
Idaho: Minidoka	**96,016**	**552**	....	**21,062**	....	....	**3,375**	**121,005**
Montana: Huntley	**26,214**	**1,401**	**1,372**	....	....	....	**3,992**	**32,979**
First unit	23,669	1,401	683	....	....	....	3,158	28,911
Second unit	1,010	....	....	....	....	....	834	1,844
Third unit	1,535	....	689	....	....	....	....	2,224
Montana: Milk River	**42,508**	....	**24,346**	**8,348**	**28,000**	....	**96,798**	**200,000**
Dodson north canal	3,339	....	560	481	....	....	7,588	11,968
Dodson south canal	6,521	....	6,200	1,033	....	....	5,507	19,261
Bowdoin Canal	3,243	....	2,606	629	....	....	4,602	11,080
Beaver Reservoir Canal	2,105	....	7,021	708	....	....	2,166	12,000
Nelson Reservoir north	5,850	....	1,600	300	....	....	4,250	12,000
Nelson Reservoir south	10,190	....	2,220	2,540	....	....	7,150	22,100
Vandalia south	6,885	....	1,734	2,142	....	....	15,050	25,811
Chinook	4,375	....	2,405	515	28,000	....	50,485	85,780
Montana: Sun River	**55,653**	**1,252**	**36,805**	**12,389**	....	**260**	**67,436**	**173,795**
Fort Shaw	11,213	1,252	525	169	....	260	2,676	16,095
Sun River Slope	480	....	10,000	1,440	....	....	3,080	15,000
Greenfields and Mill Coulee	38,500	....	22,000	6,000	....	....	8,500	75,000
Greenfields Lake	5,460	....	4,280	1,120	....	....	4,140	15,000
Benton	....	....	....	1,520	....	....	19,480	21,000
Vaughn and Sunnyside	....	....	....	2,140	....	....	29,560	31,700
Montana-North Dakota: Lower Yellowstone	**14,813**	**91**	**1,812**	**1,653**	....	**3,839**	**37,908**	**60,116**
First unit	....	....	....	....	....	....	....	42,288
Extensions	....	....	....	....	....	....	....	17,828
Nebraska-Wyoming: North Platte	**108,103**	**80**	**35,083**	**12,514**	....	....	**73,998**	**229,778**
Interstate unit	82,408	80	610	5,338	....	....	41,342	129,778
Nebraska	79,789	80	610	5,338	....	....	23,292	109,109
Wyoming	2,619	....	....	....	....	....	18,050	20,669
Units—								
North Platte Canal & Colonization Co.	....	....	....	....	....	....	17,837	17,837
First lateral district	32,956	80	337	2,128	....	....	4,124	39,643
Second lateral district	20,663	....	126	1,012	....	....	11,753	33,623
Third lateral district	28,789	....	147	2,198	....	....	7,628	38,762
Fort Laramie unit	25,695	....	34,473	7,176	....	....	32,656	100,000
Nebraska	8,542	....	7,191	3,315	....	....	26,179	45,227
Wyoming	17,153	....	27,282	3,861	....	....	6,477	54,773
Nevada: Truckee-Carson	**21,743**	**4,304**	**96,663**	**120**	**5,450**	**26,900**	**50,820**	**206,000**
Lahontan Valley (Lower Carson)	....	....	....	....	....	....	....	151,100
Truckee Canal district	....	....	....	....	....	....	....	14,800
Lahontan Bench	....	....	....	....	....	....	....	7,200
Churchill Valley	....	....	....	....	....	....	....	14,000
Pyramid Lake extension	....	....	....	....	....	....	....	18,900
New Mexico: Carlsbad	**166**	....	....	**1,220**	....	....	**23,389**	**24,775**
First	10	....	....	....	....	....	19,945	19,955
Second	156	....	....	1,220	....	....	3,444	4,820
New Mexico-Texas: Rio Grande	**553**	....	**4,890**	**2,602**	....	**360**	**146,595**	**155,000**
New Mexico	553	....	4,890	2,602	....	....	101,955	110,000
Texas	....	....	....	....	....	360	44,640	45,000
Units—								
Palomas Valley	....	....	574	119	....	....	6,292	6,985
Rincon Valley	....	....	256	1,867	....	....	19,658	21,781
Mesilla Valley, Leasburg unit	114	....	900	279	....	....	35,479	36,772

Engineering data for projects when completed—Continued.

IRRIGABLE AREA—Continued

State, project, and unit.	Public land.			State land.	Indian land.	Private land.		Total.
	Entered.	Open.	Withdrawn.			Railroad.	Other.	
New Mexico-Texas: Rio Grande—Continued.								
Units—Continued.								
Mesilla Valley, other units	*Acres.* 439	*Acres.*	*Acres.* 3,160	*Acres.* 337	*Acres.*	*Acres.*	*Acres.* 56,496	*Acres.* 60,432
El Paso Valley						360	28,670	29,030
North Dakota: North Dakota pumping	303	532	78	1,073			24,287	26,273
Buford-Trenton	249	212	78	1,006			13,480	15,025
First division	249	212	78	91			3,420	4,050
Extensions				14			1,361	1,375
Upper bottom division				501			2,099	2,600
Lower bottom division							4,000	4,000
Trenton Flat				400			2,600	3,000
Williston	54	320		67			10,807	11,248
First division	54	320		67			7,707	8,148
West bottom division							1,900	1,900
East bottom division							1,200	1,200
Oregon: Umatilla	5,031	341	2,398			3,342	25,188	36,300
First	386					320	6,262	6,968
Second	541	2				78	3,677	4,298
Third	1,249					919	1,789	3,957
Fourth	349					90	1,537	1,976
Fifth	189	18						207
Sixth	38	102				23	956	1,119
First, W. E	643	165				399	1,092	2,299
Second, W. E	1,279					265	1,404	2,948
Third, W. E	310	54				92	1,153	1,609
Future	47		2,398			1,156	7,318	10,919
Oregon-California: Klamath	2,651	132	27,300				111,599	141,682
Oregon	2,240	72	4,300				102,198	108,810
California	411	60	23,000				9,401	32,872
Units:								
First	62	23					29,414	29,499
Second							7,482	7,482
Third	2,589	109					3,232	5,930
Marginal lands (Tule)			27,300				241	27,541
Sand Hollow							13,500	13,500
Horsefly							22,000	22,000
Pine Grove							3,730	3,730
Additional units							32,000	32,000
South Dakota: Belle Fourche	35,880	2,007	15,300	4,520			40,209	97,916
First								20,910
Second								28,401
Third								16,913
Fourth								12,366
Fifth								4,745
Willow Creek extension								5,896
Nine Mile extension								8,685
Utah: Strawberry valley	1,846	54					48,100	50,000
Mapleton and Springville							10,000	10,000
Lake Shore							2,500	2,500
High Line	1,846	54					17,100	19,000
Spanish Fork							18,500	18,500
Washington: Okanogan							10,099	10,099
First							2,018	2,018
Second							6,085	6,085
Third							464	464
Old water rights							1,381	1,381
Town of Okanogan							151	151
Washington: Yakima	4,625	15	39	3,404			134,745	142,828
Sunnyside unit	2,588		39	1,158			107,043	110,828
Vested water-right lands							47,247	47,247
Public-notice lands	1,622		39	920			40,495	43,076
Irrigation-district lands	966			238			19,301	20,505
Tieton unit	2,037	15		2,246			27,702	32,000
Wyoming: Shoshone	47,896	3,619	86,400	6,326		750	2,237	147,228
First unit								15,133
Second unit								14,787
Third unit								2,734
Fourth unit								6,180
Fifth unit								3,566
Sixth unit								13,007
Subsequent units								91,821

Engineering data for projects when completed—Continued.

IRRIGABLE AREA—Continued.

State, project, and unit.	Public land.			State land.	Indian land.	Private land.		Total.
	Entered.	Open.	Withdrawn.			Railroad.	Other.	
INDIAN PROJECTS.	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*	*Acres.*
Montana: Blackfeet	11,000		50,020		61,480			122,500
Cutbank North	11,000		4,320		4,680			20,000
Cutbank South			13,180		4,820			18,000
Two Medicine			19,120		28,880			48,000
Badger-Fisher			13,000		20,000			33,000
Birch			400		3,100			3,500
Montana: Flathead	35,780		6,720	[1] 9,635	[2] 81,375		990	134,500
Jocko	680		220	700	13,900			15,500
Mission	1,000		250	1,470	19,290		990	23,000
Post	8,300		2,700	2,450	12,550			26,000
Crow	700		50	100	13,150			14,000
Pablo	15,200		2,950	3,600	15,250			37,000
Polson	200		220	85	5,495			6,000
Big Arm	500		290	630	1,580			3,000
Camas	9,200		40	600	160			10,000
Montana: Fort Peck	9,713	107		180	141,600		400	152,000
Little Porcupine					2,610			2,610
Poplar River					28,290		400	28,690
Big Porcupine					4,000			4,000
Big Muddy					18,930			18,930
Missouri River					77,770			77,770
Galpin Bottom pumping	9,713	107		180				10,000
Milk River					10,000			10,000
Total, all projects	652,104	19,659	446,722	106,297	326,405	35,451	1,494,842	3,081,480
Per cent	21.2	0.6	14.5	3.4	10.6	1.2	48.5	100.0

[1] Largely leased and sold under contract.
[2] Allotments of deceased and incompetent Indians sold at semiannual sales.

CROP STATISTICS.

Summary of crop reports on Government reclamation projects in 1917—areas (acres).

State and project.	Cereals.						Other grain and seed.						Hay and forage.							
	Barley.	Corn, Indian.	Oats.	Rye.	Wheat.	Total.	Alfalfa seed.	Clover seed.	Sorghum (grain).[1]	Flaxseed.	Millet seed.	Total.	Alfalfa hay.	Clover hay.	Other hay.	Corn fodder.	Peas.	Other forage.	Pasture.	Total.
Arizona: Salt River	9,309	1,851	900	......	3,794	15,854	100	......	25,471	......	....	25,571	67,865	......	2,443	1,031	....	......	53,222	124,561
Arizona-California: Yuma	716	346	......	......	184	1,246	4,643	......	6,883	......	....	11,526	12,901	......	306	......	....	309	1,857	15,373
California: Orland	......	......	......	......	......	......	......	......	2,495	......	....	2,495	5;331	......	316	......	....	......	2,994	8,641
Colorado:																				
Grand Valley	64	343	631	2	857	1,897	4	......	......	......	20	24	409	......	193	335	....	456	65	1,458
Uncompahgre	377	1,419	5,640	28	10,405	17,869	38	48	......	......	....	86	19,436	110	376	254	10	382	2,241	22,809
Idaho:																				
Boise	3,217	1,414	3,205	132	25,676	33,644	375	4,496	21	......	9	4,901	34,087	7,678	513	440	....	43	6,555	49,316
Minidoka—																				
Gravity unit	780	132	2,957	166	5,553	9,588	173	696	......	......	....	869	25,957	1,135	......	......	134	129	4,647	32,002
Pumping unit	550	7	1,726	......	9,524	11,807	32	2,398	......	......	....	2,430	16,803	992	77	17	390	16	2,775	21,070
Montana:																				
Huntley	109	186	2,420	......	4,330	7,045	13	120	......	11	....	144	6,002	100	397	66	....	6	1,450	8,021
Milk River	108	10	682	......	2,310	3,110	2	......	......	534	....	536	2,067	......	5,605	......	....	......	66	7,738
Sun River	89	......	439	......	1,160	1,688	62	......	......	110	....	172	4,250	......	294	......	7	......	810	5,361
Montana - North Dakota: Lower Yellowstone	798	156	1,526	28	2,963	5,471	28	......	......	1,239	....	1,267	7,481	......	622	266	....	......	606	8,975
Nebraska-Wyoming: North Platte	3,052	6,051	10,173	471	3,128	22,875	40	......	......	......	309	349	34,374	......	1,015	763	....	42	3,946	40,140
Nevada: Truckee-Carson	1,116	......	27	......	2,532	3,675	......	......	......	......	....	......	22,501	......	940	......	....	......	10,100	33,541
New Mexico: Carlsbad	120	729	423	15	1,459	2,746	2,113	......	221	......	....	2,334	5,556	......	643	707	....	......	4,175	11,081
New Mexico-Texas: Rio Grande	3,610	10,566	1,145	65	11,714	27,100	33	......	1,894	......	....	1,927	26,112	......	440	2,113	114	......	2,158	30,937
Oregon: Umatilla	4	130	......	......	9	143	83	......	......	......	3	86	4,047	......	221	110	....	......	1,293	5,671
Oregon-California: Klamath	6,153	......	3,238	678	2,821	12,890	......	......	......	......	....	......	9,811	......	1,971	......	....	......	7,836	19,618
South Dakota: Belle Fourche	2,286	2,902	4,955	76	5,122	15,341	942	......	......	870	....	1,812	19,702	......	4,475	1,166	....	......	6,100	31,443
Utah: Strawberry Valley	503	382	2,180	74	8,541	11,680	......	......	......	......	....	......	7,162	......	233	14	....	......	984	8,393
Washington:																				
Okanogan	......	112	......	......	60	172	......	......	......	......	....	......	1,933	30	140	58	....	......	138	2,299
Yakima—																				
Sunnyside unit	764	5,796	304	......	2,919	9,783	......	......	......	......	....	......	31,678	......	1,209	1,260	....	1,414	4,031	39,592
Tieton unit	781	603	604	......	3,912	5,900	......	......	......	......	....	......	10,529	185	544	60	....	188	1,224	12,730
Wyoming: Shoshone	303	11	7,371	7	5,841	13,533	49	354	......	......	....	403	13,483	173	137	66	....	......	2,035	15,894
Total	34,809	33,146	50,546	1,742	114,814	235,057	8,730	8,112	36,985	2,764	341	56,932	389,477	10,403	23,110	8,726	655	2,985	121,308	556,664

[1] Harvested and fed in various forms.

State and project.	Vegetables and truck.						Fruit and nuts.							
	Beans.	Onions.	Potatoes, white.	Potatoes, sweet.	Truck.	Total.	Apples.	Peaches.	Pears.	Prunes.	Citrus fruit.	Small fruit.	Miscellaneous.	Total.
Arizona: Salt River	1,425	....	373	69	4,380	6,247	....	595	91	....	967	462	[1] 341	2,456
Arizona-California: Yuma	367	....	....	....	746	1,113	....	....	....	....	....	....	155	155
California: Orland	79	40	65	....	279	463	....	....	....	40	121	6	223	390
Colorado:														
Grand Valley	597	3	171	....	101	872	505	39	110	....	....	4	....	658
Uncompahgre	1,951	570	5,940	....	115	8,576	2,350	128	6	12	....	69	....	2,565
Idaho:														
Boise	475	16	2,165	7	691	3,354	3,126	177	5	266	....	53	....	3,627
Minidoka—														
Gravity unit	773	34	2,940	....	555	4,302	590	....	....	....	....	18	....	608
Pumping unit	113	14	2,906	....	390	3,423	94	....	....	....	....	3	....	97
Montana:														
Huntley	129	....	164	....	203	496	2	....	....	....	....	....	....	2
Milk River	23	....	87	....	31	141	....	....	....	....	....	....	....	....
Sun River	....	....	165	....	56	221	....	....	....	....	....	3	....	3
Montana-North Dakota: Lower Yellowstone	88	....	249	....	116	453	....	....	....	....	....	....	....	....
Nebraska-Wyoming: North Platte	2,304	17	4,833	....	291	7,445	....	....	....	....	....	....	....	....
Nevada: Truckee-Carson	....	....	322	....	555	877	....	....	....	....	....	....	....	....
New Mexico: Carlsbad	118	....	....	5	32	155	....	....	....	....	....	....	....	....
New Mexico-Texas: Rio Grande	4,011	11	7	338	2,940	7,307	378	228	814	....	....	115	....	1,535
Oregon: Umatilla	4	2	106	....	61	173	342	160	10	....	....	49	....	561
Oregon-California: Klamath	....	....	229	....	106	335	....	....	....	....	....	....	32	32
South Dakota: Bell Fourche	217	....	285	....	161	663	....	....	....	....	....	....	....	....
Utah: Strawberry Valley	172	....	434	....	104	710	33	....	....	....	....	....	140	178
Washington:														
Okanogan	117	2	142	....	82	343	4,637	74	13	5	....	17	[1] 17	4,763
Yakima—														
Sunnyside unit	988	88	5,394	....	1,426	7,896	10,677	999	1,481	252	....	339	....	13,748
Tieton unit	774	82	1,636	....	279	2,771	5,275	362	674	....	....	47	....	6,358
Wyoming: Shoshone	131	7	568	....	251	957	5	....	....	....	....	2	....	7
Total	14,856	886	29,181	419	13,951	59,293	28,014	2,762	3,204	575	1,088	1,187	908	37,738

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[1] Apricots.

Summary of crop reports on Government reclamation projects in 1917—areas (acres)—Continued.

State and project.	Miscellaneous.					Duplicated areas.	Total cropped.	Irrigated, no crop.					Total irrigated.
	Beets, sugar.	Cotton.	Cane.	Other.	Total.			Young alfalfa.	Young fruit.	Fall plowing.	Miscellaneous.	Duplicated.	
Arizona: Salt River		23,445	69	[1] 317	23,831	10,020	188,500		5,748		12,352	5,000	201,600
Arizona-California: Yuma		12,706		[1] 303	13,009	6,844	35,578				1,378		36,956
California: Orland				88	88	2,469	9,608	660	1,618		843		12,729
Colorado:													
Grand Valley	456			1,598	2,054	2,440	4,523	370	145	968		717	5,289
Uncompahgre	1,310			68	1,378	566	52,717	2,890	274	1,727	1	4,501	53,108
Idaho:													
Boise	25			495	520	6,630	88,732	8,638	1,313	914	3,087	7,160	96,524
Minidoka—													
Gravity unit	2,753			1,553	4,306		51,675	4,645	384	340	35	1,279	55,800
Pumping unit	2,126				2,126	172	40,781	1,455	130	424	1,570	1,140	43,220
Montana:													
Huntley	3,366		16	15	3,397		19,105		17				19,122
Milk River				26	26	658	10,893	165					11,058
Sun River							[2] 7,445				20		[2] 6,675
Montana-North Dakota: Lower Yellowstone	307			46	353	860	15,659				85		15,744
Nebraska-Wyoming: North Platte	9,357			594	9,951		80,760	8,280			666	6,503	83,203
Nevada: Truckee-Carson	2,168				2,168	1,025	39,236				1,156		40,392
New Mexico: Carlsbad		4,015	428		4,443	5,030	15,729	111			2,488	1,446	16,882
New Mexico-Texas: Rio Grande	1,078			5	1,083	6,263	63,626	39	1,188		545	1,090	64,308
Oregon: Umatilla				77	77	1,165	5,546	906	518	82	380	97	7,335
Oregon-California: Klamath	54				54		32,929				706		33,635
South Dakota: Belle Fourche	1,771			169	1,940	1,173	50,026	2,275	14			2,043	50,272
Utah: Strawberry Valley	5,157		9		5,166	502	25,620				1,527		27,147
Washington:													
Okanogan				43	43	1,306	6,314	139	881		860	194	8,000
Yakima—													
Sunnyside unit	1,976			122	2,098	7,314	65,803	2,569	1,055		12,590	1,517	80,500
Tieton unit	247			324	571	3,905	24,425	689	1,520		581	1,815	25,400
Wyoming: Shoshone	773				773	13	31,554	2,467	132	281	159	1,829	32,764
Total	32,924	40,166	522	5,843	79,455	58,355	[2] 966,784	36,298	14,937	4,736	41,029	36,331	[2] 1,026,663

[1] Broom corn.

[2] Figures for Sun River project are for 176 irrigated farms, which included 770 acres cropped without irrigation and 20 acres irrigated, but not cropped.

Summary of crop reports on Government reclamation projects in 1917—Total yields.

State and project.	Cereals.						Other grain and seed.						Hay and forage.						
	Barley.	Corn, Indian.	Oats.	Rye.	Wheat.	Total.	Alfalfa seed.	Clover seed.	Sorghum[1] (grain).	Flaxseed.	Millet seed.	Total.	Alfalfa hay.	Clover hay.	Other hay.	Corn fodder.	Peas.	Other forage.	Total.
	Bush.	*Bush.*	*Bushels.*	*Bush.*	*Bushels.*	*Bushels.*	*Bush.*	*Bush.*	*Bushels.*	*Bush.*	*Bush.*	*Bushels.*	*Tons.*	*Tons.*	*Tons.*	*Tons.*	*Bush.*	*Tons.*	*Tons.*
Arizona: Salt River	320,000	59,500	47,750	...	88,540	515,790	217	...	1,001,000	...	...	1,001,217	285,030	...	4,642	5,362	...	...	295,034
Arizona-California: Yuma	21,578	10,230	...	...	3,479	35,287	26,475	...	280,540	...	...	307,015	43,177	...	882	...	...	1,770	45,829
California: Orland	...	...	...	...	...	...	...	...	70,970	...	...	70,970	25,700	...	431	...	...	...	26,131
Colorado:																			
Grand Valley	799	6,958	11,145	30	13,095	32,027	30	...	...	...	133	163	1,162	...	120	845	...	...	2,127
Uncompahgre	9,989	39,864	164,362	579	247,427	462,221	104	120	...	...	...	224	54,057	125	447	1,457	280	2,778	58,867
Idaho:																			
Boise	65,618	53,600	81,790	1,540	544,800	747,348	843	17,138	108	...	200	18,289	132,805	15,570	725	2,887	...	430	152,417
Minidoka—																			
Gravity unit	20,105	3,267	85,502	1,807	128,276	238,957	1,065	4,018	...	...	...	5,083	96,809	3,501	...	...	1,601	2,038	102,396
Pumping unit	11,358	160	46,814	...	189,030	247,362	116	8,955	...	...	...	9,071	56,374	2,063	101	75	4,048	252	58,987
Montana:																			
Huntley	1,304	3,497	70,470	...	83,450	158,721	56	508	...	5	...	569	14,062	117	401	106	...	18	14,704
Milk River	602	180	11,503	...	14,805	27,090	16	...	...	1,915	...	1,931	3,313	...	3,289	...	...	...	6,602
Sun River	2,192	...	10,924	...	21,716	34,832	392	...	...	439	...	831	7,087	...	275	...	65	...	7,364
Montana-North Dakota: Lower Yellowstone	14,646	4,252	39,530	466	41,850	100,744	93	...	...	7,295	...	7,388	14,135	...	540	606	...	...	15,281
Nebraska-Wyoming: North Platte	94,868	117,008	243,764	3,434	47,467	506,541	51	...	...	...	2,799	2,850	58,656	...	853	1,191	...	444	61,144
Nevada: Truckee-Carson	26,834	...	938	...	43,233	71,005	...	...	...	...	...	...	73,171	...	763	...	...	...	73,934
New Mexico: Carlsbad	926	11,947	6,021	195	13,738	32,827	6,542	...	4,865	...	...	11,407	9,762	...	237	787	...	...	10,786
New Mexico-Texas: Rio Grande	91,679	265,836	40,294	1,210	261,970	660,989	139	...	38,566	...	...	38,705	64,569	...	677	6,188	1,240	...	71,471
Oregon: Umatilla	48	3,799	...	...	150	3,997	256	...	...	...	15	271	14,834	...	195	571	...	...	15,600
Oregon-California: Klamath	109,259	...	82,708	4,896	39,753	236,616	...	...	...	...	...	...	31,158	...	2,837	...	...	...	33,995
South Dakota: Belle Fourche	55,164	46,290	106,309	1,500	67,095	276,358	2,335	...	...	2,129	...	4,464	35,692	...	...	1,918	...	...	37,610
Utah: Strawberry Valley	24,311	6,320	76,169	334	203,753	310,887	...	...	...	...	...	...	22,588	...	418	26	...	...	23,032
Washington:																			
Okanogan	...	2,679	...	...	758	3,437	...	...	...	...	...	...	4,588	43	136	135	...	...	4,902
Yakima—																			
Sunnyside unit	23,779	274,000	13,452	...	58,380	369,611	...	...	...	...	...	...	143,551	...	3,627	8,820	...	21,210	177,208
Tieton unit	16,510	22,468	19,313	...	81,653	139,944	...	...	...	...	...	...	32,244	275	813	211	...	1,948	35,491
Wyoming: Shoshone	4,491	196	185,198	40	114,365	304,290	173	1,528	...	...	...	1,701	30,258	256	114	362	...	...	30,990
Total	916,060	932,051	1,343,956	16,031	2,308,783	5,516,881	38,903	32,267	1,396,049	11,783	3,147	1,482,149	1,254,782	21,950	22,523	31,547	7,234	30,883	1,361,902

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[1] Harvested or fed in various forms; the figures are in terms of grain.

Summary of crop reports on Government reclamation projects in 1917—Total yields—Continued.

State and project.	Vegetables.				Fruits and nuts.								Miscellaneous.			
	Beans.	Onions.	Potatoes, white.	Potatoes, sweet.	Apples.	Peaches.	Pears.	Prunes.	Citrus fruit.	Small fruit.	Miscellaneous.	Total.	Sugar beets.	Cotton.	Cottonseed.	Cane.
	Bush.	*Bush.*	*Bushels.*	*Bush.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Tons.*	*Pounds.*	*Pounds.*	*Tons.*
Arizona: Salt River	38,900	......	37,300	115	......	3,336,760	118,730	......	[1] 6,560,000	[1] 3,500,000	2,046,500	15,561,990	......	5,861,000	16,410,000	172
Arizona-California: Yuma	4,454	......	......	......	......	......	......	......	......	......	[1] 300,000	300,000	......	5,253,454	12,380,000	......
California: Orland	602	10,000	3,900	......	......	......	......	76,000	81,600	[1] 20,000	150,210	327,810	......	......	......	......
Colorado:																
Grand Valley	4,576	328	13,826	......	1,492,000	260,330	293,940	......	......	4,300	......	2,050,570	4,822	......	......	......
Uncompahgre	21,770	147,575	1,315,382	......	12,760,850	795,250	18,560	30,750	......	139,750	......	13,745,160	10,954	......	......	......
Idaho:																
Boise	4,800	1,770	350,450	540	6,578,000	770,000	5,000	307,650	......	53,000	......	7,713,650	375	......	......	......
Minidoka—																
Gravity unit	19,930	1,865	601,756	......	782,110	......	......	......	......	18,000	......	800,110	35,364	......	......	......
Pumping unit	1,216	1,002	647,975	......	85,810	......	......	......	......	2,450	......	88,260	23,825	......	......	......
Montana:																
Huntley	376	......	21,272	......	1,800	......	......	......	......	......	......	1,800	28,553	......	......	105
Milk River	150	......	7,563	......	......	......	......	......	......	......	......	......	......	......	......	......
Sun River	......	......	28,704	......	......	......	......	......	......	2,070	......	2,070	......	......	......	......
Montana-North Dakota: Lower Yellowstone	563	......	28,557	......	......	......	......	......	......	......	......	......	2,443	......	......	......
Nebraska-Wyoming North Platte	14,224	1,695	1,119,626	......	......	......	......	......	......	......	......	......	99,790	......	......	......
Nevada: Truckee-Carson	......	......	56,433	......	......	......	......	......	......	......	......	......	11,048	......	......	......
New Mexico: Carlsbad	492	......	......	398	......	......	......	......	......	......	......	......	......	754,987	1,212,480	866
New Mexico-Texas: Rio Grande	46,058	43	630	21,290	262,960	400	837,612	......	......	193,530	......	1,294,502	8,420	......	......	......
Oregon: Umatilla	21	226	10,311	......	772,720	438,834	22,100	......	......	[1] 100,000	......	1,333,654	......	......	......	......
Oregon-California: Klamath	......	......	24,323	......	......	......	......	......	......	......	[1] 32,000	32,000	549	......	......	......
South Dakota: Belle Fourche	1,155	......	27,310	......	......	......	......	......	......	......	......	......	10,502	......	......	......
Utah: Strawberry Valley	1,649	......	51,286	......	87,500	......	......	......	......	......	[1] 140,000	227,500	52,888	......	......	34
Washington:																
Okanogan	722	[1] 300	13,383	......	18,017,680	266,100	94,535	20,500	......	[1] 50,000	103,050	18,551,865	......	......	......	......
Yakima—																
Sunnyside unit	18,706	8,820	1,252,333	......	94,982,400	8,487,500	12,573,500	3,798,525	......	[1] 1,000,000	......	120,841,925	19,760	......	......	......
Tieton unit	12,457	12,123	284,275	......	21,234,350	1,345,400	1,747,480	......	......	146,890	......	24,474,120	2,103	......	......	......
Wyoming: Shoshone	769	1,410	118,788	......	1,280	......	......	......	......	1,650	......	2,930	7,075	......	......	......
Total	193,590	187,157	6,015,383	22,343	157,059,460	15,700,574	15,711,457	4,233,425	6,641,600	5,231,640	2,771,760	207,349,916	318,471	11,869,441	30,002,480	1,177

[1] Estimated roughly.

Summary of crop reports on Government reclamation projects in 1917—Crop values.

State and project.	Cereals.						Other grain and seed.					
	Barley.	Corn, Indian.	Oats.	Rye.	Wheat.	Total.	Alfalfa seed.	Clover seed.	Sorghum. (grain).	Flaxseed.	Millet seed.	Total.
Arizona, Salt River	$422,416	$66.636	$39,395		$159,369	$687,816	$1,690		$1,260,810			$1,262,500
Arizona-California, Yuma	24,366	10,757			6,314	41,437	262.928		281,120			544,048
California, Orland									106,455			106,455
Colorado:												
Grand Valley	1,118	13,333	10,120	$ 54	26,345	50,970	234				$240	474
Uncompahgre	13,682	58,653	135,520	856	472,111	680,822	906	$766				1,672
Idaho:												
Boise	78,742	80,416	81,790	2,156	1,089,600	1,332,704	8,430	222,794	216		300	231,740
Minidoka—												
Gravity unit	20.105	3,267	68,402	1,807	228,331	321,912	9,585	56,252				65,837
Pumping unit	11,358	160	37,451		336,473	385,442	1,044	125,370				126,414
Montana:												
Huntley	1,570	5,100	54,915		156,838	218.423	820	4,890		$10		5,720
Milk River	602	180	9,202		28,129	38.113	240			5,688		5,928
Sun River	2.192		9,285		41,260	52,737	4,228			1,273		5,501
Montana-North Dakota, Lower Yellowstone	14,646	5,953	27,671	699	82,863	131,832	1,209			21,825		23,034
Nebraska-Wyoming, North Platte	113,842	175,512	170,635	5.151	85,440	550,580	510				4,200	4,710
Nevada, Truckee-Carson	33,540		938		82,143	116,621						
New Mexico, Calsbad	2,032	18,998	5,744	351	27,515	54.640	56,378		8.566			64,944
New Mexico-Texas, Rio Grande	128,350	372,170	32,235	2,372	523,940	1,059,067	1,668		46,267			47,935
Oregon, Umatilla	60	7,395			315	7,770	2,625				100	2,725
Oregon-California, Klamath	118,000		66,166	8,911	77,518	270,595						
South Dakota, Belle Fourche	68,955	92,580	74,416	2,550	127,480	365,981	18,680			4,790		23,470
Utah, Strawberry Valley	36,466	6,067	76,169	601	387,131	506,434						
Washington:												
Okanogan		3,257			1,966	5,223						
Yakima—												
Sunnyside unit	33,290	342,500	13,450		116,760	506,000						
Tieton unit	21,463	28,085	17,382		146,975	213,905						
Wyoming, Shoshone	5,165	294	148,159	46	211,575	365,239	1,903	16,808				18,711
Total	1,151,960	1,291,313	1,079,045	25,554	4,416,391	7,964,263	373,078	426,880	1,703,434	33,586	4,840	2,541,818

Summary of crop reports on Government reclamation projects in 1917—Crop values—Continued.

State and project.	Hay and forage.								Vegetables and truck.					
	Alfalfa hay.	Clover hay.	Other hay.	Corn fodder.	Peas.	Other forage.	Pasture.	Total.	Beans.	Onions.	Potatoes, white.	Potatoes, sweet.	Truck.	Total.
Arizona, Salt River	$4,275,450	....	$64,988	$134,050	....	....	$1,064.444	$5,538,932	$192,375	....	$50,353	$16,500	$551.985	$811.213
Arizona-California, Yuma	642,870	....	8,811	....	....	$75,962	24,278	751,921	20,329	....	....	....	80,617	100,946
California, Orland	362,370	....	7,110	....	....	....	18,992	388,472	3.250	$2,015	2,925	....	18,837	27,027
Colorado:														
Grand Valley	15,861	....	1,596	4,562	....	2,355	654	25,028	23,044	600	15,480	....	7,467	46,591
Uncompahgre	651,608	$1,263	4,590	12,555	$720	23,426	18,082	712,244	111,342	175,898	1,070,955	....	10,313	1,368,508
Idaho:														
Boise	1,992,075	233,550	8,700	14,435	....	2,150	62,250	2,313,160	28,800	2,124	262,840	1,180	50,263	345,207
Minidoka—														
Gravity unit	1,452,135	52,515	....	....	4,803	10,190	71,728	1,591,371	119,580	4.476	451,317	....	45,173	620,546
Pumping unit	845,610	30,945	1,515	750	12,144	1,260	48,222	940,446	7,296	2,405	485,981	....	26,415	522,097
Montana:														
Huntley	206,840	1,944	6,921	1,180	....	180	9,237	226,302	2,330	....	16,300	....	12,797	31,427
Milk River	62,947	....	82,225	....	....	....	465	145,637	1,290	....	13.612	....	3.430	18,332
Sun River	120,479	....	4,147	....	97	....	4,136	128,859	....	....	25,833	....	5,890	31,723
Montana-North Dakota, Lower Yellowstone	216,266	....	6,750	6,363	....	....	7,575	236,954	6,080	....	32,841	....	11,921	50,942
Nebraska-Wyoming, North Platte	997,152	....	10,236	2,382	....	2,220	50,890	1,062,880	85,344	3,814	895,700	....	28,865	1,013,723
Nevada, Truckee-Carson	1,097,565	....	7,630	....	....	....	46,016	1,151,205	....	....	50,790	....	43,480	94,270
New Mexico, Carlsbad	214,444	....	4,244	8,903	....	....	32,550	260,141	2,789	....	....	955	2,363	6,107
New Mexico-Texas, Rio Grande	1,743,363	....	13,540	99,008	5,208	....	64,740	1,925,859	173,078	61	787	12,774	295,145	481,845
Oregon, Umatilla	227,940	....	2,565	4,630	....	....	15,895	251,030	160	325	11,680	....	7,310	19,475
Oregon-California, Klamath	467,370	....	42,555	....	....	....	35,262	545,187	....	....	20,674	....	6,650	27,324
South Dakota, Belle Fourche	535,380	....	49,728	15,344	....	....	66,709	667,161	6,930	....	24,579	....	11,906	43,415
Utah, Strawberry Valley	338,820	....	4,180	130	....	....	9,694	352,824	9,148	....	33,849	....	7,086	50,083
Washington:														
Okanogan	68,826	645	2,041	1,348	....	....	2,165	75,025	4,362	431	8,041	....	9,215	22,049
Yakima—														
Sunnyside unit	2,871,020	....	79,795	52,920	....	169,680	100,775	3,274,190	104,754	11.025	1,001,865	....	206,540	1,324,184
Tieton unit	580,392	4,125	12,195	1,055	....	14,610	30,600	642,977	74,742	21,215	213,206	....	34,875	344,038
Wyoming, Shoshone	453,870	3,840	1,710	5,430	....	....	46,825	511,675	4,614	2,115	83,152	....	25,920	115,801
Total	20,440,653	328,827	427,772	365,045	22,972	302,033	1,832,178	23,719,480	981,637	226,504	4,772,760	31,409	1,504,463	7,516,773

State and project.	Fruit and nuts.								Miscellaneous.					Total.
	Apples.	Peaches	Pears.	Prunes.	Citrus fruit.	Small fruit.	Miscellaneous.	Total.	Beets, sugar.	Cotton and cotton seed.	Cane.	Other.	Total.	
Arizona, Salt River		$60,735	$3,560		$272,439	$97,393	$51,162	$491,289		$4,888,050	$4,300	$7,900	$4,990,250	$13,692,000
Arizona-California, Yuma							7,544	7,544		2,280,823		25,950	2,306,773	3,752,669
California, Orland				$5,320	2,448	700	7,448	15,916				5,700	5,700	543,570
Colorado:														
Grand Valley	$23,511	7,478	7,213			213		38,415	$33,754			3,728	37,482	198,960
Uncompahgre	180,057	14,192	771	730		7,472		203,222	78,323			6,877	85,200	3,051,668
Idaho:														
Boise	98,670	7,700	150	5,384		2,650		114,554	2,250			46,930	49,180	4,386,545
Minidoka—														
Gravity unit	15,642					2,700		18,342	247,548			110,229	357,777	2,975,785
Pumping unit	1,716					368		2,084	166,775				166,775	2,143,258
Montana:														
Huntley	40							40	207,560		1,075	283	208,918	690,830
Milk River												325	325	208,335
Sun River						310		310						213,130
Montana-North Dakota, Lower Yellowstone									15,880			1,015	16,895	459,557
Nebraska-Wyoming, North Platte									748,425			4,742	753,167	3,385,060
Nevada, Truckee-Carson									88,384				88,381	1,450,480
New Mexico, Carlsbad										222,510	15,476		237,986	623,818
New Mexico-Texas, Rio Grande	10,518	16	25,128			5,806		41,468	42,100			150	42,250	3,598,424
Oregon, Umatilla	13,630	5,895	760			4,205		24,490				5,905	5,905	311,395
Oregon-California, Klamath							800	800	3,294				3,294	847,200
South Dakota, Belle Fourche									68,263			2,949	71,212	1,171,239
Utah, Strawberry Valley	1,093						9,755	10,848	370,216		340		370,556	1,290,745
Washington:														
Okanogan	495,486	5,322	2,701	410		3,011	2,061	508,991				5,352	5,352	616,640
Yakima—														
Sunnyside unit	1,899,650	212,188	439,970	132,948		50,850		2,735,606	138,320			27,930	166,250	3,006,230
Tieton unit	424,687	33,635	34,950			10,282		503,554	14,721			58,400	73,121	1,777,595
Wyoming, Shoshone	64					165		229	49,525				49,525	1,061,180
Total	3,164,764	353,161	515,203	144,792	274,887	186,125	78,770	4,717,702	2,275,338	7,391,383	21,191	314,365	10,002,277	56,462,313

ACCOUNTING TERMINOLOGY.

Accounting.—The art or science of analyzing, classifying, recording, summarizing, and interpreting facts relating to the acquisition, production, transfer, and ownership of articles of wealth or value.

Accounts.—Systematic statements of financial facts of identical or opposite character, so arranged as to readily provide summaries or balances of the same.

Accruals of water-right charges.—The installments on account of construction or operation and maintenance charges which become due upon definite dates.

Advance payments of water-right charges.—The amounts paid by water users in excess of accruals.

Allotment.—As used in the Reclamation Service, an allotment is that part of an appropriation which is allotted by the Reclamation Commission to a project for expenditure.

Appropriation.—As used in Reclamation Service accounting, this represents the amount of money set aside by Congress from the Reclamation fund to be used in the construction or operation and maintenance, or both, of a project.

Assets of a project.—The amount of money, or property expressed in terms of money, which the project owns or which is at its disposal.

Bookkeeping.—The mechanical operation of assembling financial data in books of record. (See *Accounts* and *Accounting.*)

Capital investment.—The group of accounts representing actual transactions in cash, or its equivalent. All money transactions and transactions in property and services expressed in terms of money, will be finally recorded in this group. The total "disbursements" less the total "collections" is the "net investment."

Charges, water-right.—See *Construction* and *Operation and maintenance charge.*

Clearing accounts.—Accounts for handling operating expenses incidental to the work, which can not be charged with reasonable accuracy direct to feature costs, and which are "cleared" in some more or less arbitrary manner at the close of stated periods.

Collections.—Moneys, or the equivalent thereof, received by the Government in liquidation of a debt due or to become due.

Commercial paper.—As used in Reclamation accounting, commercial paper is synonymous with personal checks, bank drafts, post-office money orders, and like documents which are convertible directly into cash or its equivalent.

Construction cost.—See *Cost.*

Construction water-right charge.—A charge assessed against the irrigable area to cover the cost of construction of the irrigation system.

Controlling accounts.—Accounts established in the general ledger in which are summarized the transactions recorded and carried in subsidiary or auxiliary records.

Cost.—The *gross cost* of construction of a project is the value of services performed or property used, either directly or indirectly, in connection with the construction of the irrigation and auxiliary works of the project. It does not include the value of materials purchased and still in stock, but does include services and materials used, even though still unpaid and carried as liabilities. The *net cost* of construction of a project is its gross cost less the value of all revenues the occurrence or accrual of which is incidental to the work during the period of construction.

Depreciation.—The reduction of the original cost or value, due to deterioration by wear and tear or otherwise, of a structure, facility, or unit of equipment.

Detail cost accounts.—Classes or divisions of expense making up the cost of a physical feature.

Disbursements.—See *Expenditure.*

Equipment.—Equipment, or nonexpendable property, is property which neither loses its identity, becomes a permanent fixture, nor is immediately consumed when applied to its intended use.

Estimate.—As used in the Reclamation Service, an estimate is an opinion or calculation obtained from the best information at hand of the cost of doing a stated work and of the quantities of the several units of work contained therein.

Expenditure.—The payment or disbursement of cash, or its equivalent, when such act operates to deprive the payor of further use or control of the article or property thus disbursed. In theory, when the construction of a project is completed, all liabilities and obligations liquidated, and all cash, equipment, materials, and other like assets expended in the work, then the "total expenditures" and the "gross construction cost" of the project will be equal.

Funds.—The amount of money available for expenditure for a specified purpose.

Gross costs.—See *Cost.*

Inventory.—An itemized account, catalogue, or schedule of equipment, materials, supplies, or other property which is on hand and available for use.

Investment.—See *Capital investment.*

Invoice.—The vendor's statement of goods sold, containing items, unit prices, and value of merchandise delivered or to be delivered. In Reclamation accounting the term "invoice" must never be confused with "inventory."

Liabilities.—The amount of money, or of property or services expressed in terms of money, which the project owes, or is under obligation to pay, deliver, or render. (Repayment accounts are included in the project's liabilities for the reason that such accounts represent the amount of money which the project must return to the Government.)

Maintenance.—See *Operation and maintenance.*

Mercantile store.—The term used to designate buildings and contents where goods are kept for the purpose of sale, either for cash or coupons, or to be charged as deductions on pay rolls.

Mess house.—The term used to designate an eating place or dining room. It is improper to refer to such a place as a "commissary."

Nonexpendable property.—See *Equipment.*

Obligations.—See *Liabilities.*

Operation and maintenance.—"Operation" is the actual use of an irrigation system for the development and distribution of water, including works for drainage and flood protection, to preserve the irrigated lands against excess water. "Maintenance" embraces the repairs and renewals necessary to preserve the irrigation and drainage system in its original efficiency.

Operation and maintenence water-right charge.—An annual charge assessed against the irrigable area to cover the cost of the operation and maintenance of the irrigation system.

Operation and maintenence year.—The irrigation year, usually the calendar year (Jan. 1 to Dec. 31, inclusive). On some southern projects the operation and maintenance year is arranged to accord with the irrigation season, but unless otherwise specified the term "Operation and maintenance year" is synonymous with calendar year.

Original entry.—The first record made of a charge or credit which becomes the basis of proof of the account.

Physical features.—The division of principal features for the purpose of collecting special costs on separate and distinct jobs or units or divisions of a project. They usually represent some tangible product when construction is completed, such as a canal, dam, bridge, etc.

Physical inventory.—The act of determining the quantity of equipment, materials, or supplies on hand by actual counting, weighing, or measuring each kind of property, and of making definite record thereof.

Plants or plant accounts.—As used in Reclamation accounting, these accounts are designed to receive all charges for the cost of original equipment and installation, with additions thereto, and also the cost of extraordinary repairs and of temporary plants erected to facilitate work on a project.

Posting.—The act of transferring amounts from a book or record of original entry to a ledger.

Principal features represent a general division of the project into primary parts or units; the nature or function of each feature is usually implied by its name, such as examination and survey, storage works, canal system, etc.

Property nonexpendable.—See *Equipment.*

Refund.—A reimbursement of an amount previously paid.

Register.—As used in Reclamation accounting, this is a journal which, by special ruling, is designed to facilitate the recording of accounting transactions. It is usually, but not always, a book of original entry.

Reimbursable accounts.—Those kept to record the results of operations not directly related to cost-ledger features; the cost of their maintenance is reimbursed by cash receipts or deductions from Service earnings.

Repair.—Replacement of some part of a structure, facility, or unit of equipment, made necessary through wear or other casualty, when such replacement does not amount to a substantial change of identity in such structure, facility, or unit of equipment.

Repayments.—Represent the sources from which the Government expects to secure reimbursement to the Reclamation fund.

Replacement.—The substitution, as a whole, for a structure, facility, or equipment, worn out or become inadequate in service, such substitution having no greater capacity than the thing for which it was substituted.

Resources.—See *Assets.*

Revenues.—Revenues are incidental to the construction or operation and maintenance of a project, and the accruals thereof tend to decrease the gross costs of the construction or operation and maintenance of the project as a whole.

Storehouses.—As distinguished from mercantile stores, storehouses are the buildings, bins, chutes, or yards in which Government property is stored, available for assignment to the work, or transfer to other storehouses or projects.

Supplemental construction.—The improvements of an irrigation or drainage system, or any part or structure thereof, of a completed project, or of a completed portion of a project, as to which the construction charges have been announced.

Water-right charges.—See *Construction* and *Operation and maintenance charge.*

ADMINISTRATIVE ORGANIZATION.

DEPARTMENT OF THE INTERIOR.

Hon. Franklin Knight Lane, Secretary of the Interior.
Alexander T. Vogelsang, First Assistant Secretary.
Selden G. Hopkins, Assistant Secretary.
Charles D. Mahaffie, Solicitor for the Interior Department.
Edgar C. Bradley, Assistant to the Secretary.
Brig. Gen. William L. Marshall, United States Army, retired, consulting engineer to the Secretary.
Arthur Powell Davis, Director and Chief Engineer of the Reclamation Service.
Will R. King, Chief Counsel of the Reclamation Service.
H. T. Cory, in charge of drainage and cut-over land investigation, Southern States, for the Reclamation Service.
F. W. Hanna, in charge of drainage and cut-over land investigation, Northern States, for the Reclamation Service.
Elwood Mead, in charge of settlement problems, Reclamation Service.
Clay Tallman, Commissioner of the General Land Office.
Cato Sells, Commissioner of Indian Affairs.
Gaylord M. Saltzgaber, Commissioner of Pensions.
James T. Newton, Commissioner of Patents.
Philander P. Claxton, Commissioner of Education.
George Otis Smith, Director of the Geological Survey.
Van. H. Manning, Director of the Bureau of Mines.
Stephen T. Mather, Director of the National Park Service.

UNITED STATES RECLAMATION SERVICE.

WASHINGTON OFFICE.

Office of the director and chief engineer: Morris Bien, assistant to the director; C. J. Blanchard, statistician; Hugh A. Brown, editor Reclamation Record; C. A. Bissell, assistant engineer; J. H. Pellen, draftsman; F. L. Cavis, chief accountant; A. H. Gullickson, western district; C. E. Piatt, southern district, F. G. Hough, northern district, examiners of accounts; C. A. Lyman, chief of repayment accounts section; C. E. Harris, auditor of transportation accounts; Mrs. J. T. Davis, chief of auditing section; E. J. Wolcott, chief of bookkeeping section; C. H. Fitch, chief clerk; C. N. McCulloch, chief of mails and files section; Emmet Carr, purchasing agent; Harry Caden, fiscal agent; T. E. Brown, chief of stenographic section; G. W. Numbers, appointment clerk; J. V. Ryan, settlement agent, 338 Railway Exchange Building, Kansas City, Mo.

Office of the assistant to the director: D. H. Sibbett, counsel; J. E. Golladay and Mrs. G. B. Mathiot, assistant counsel; Mrs. E. W. Ballard, clerk.

Office of the chief counsel: G. A. Ward, O. Hamele, and E. W. R. Ewing, counsel.

DENVER OFFICE.

F. E. Weymouth, chief of construction, Tramway Building, Denver, Colo.; R. F. Walter and C. P. Williams, assistant chiefs of construction; J. M. Gaylord, electrical engineer; J. L. Savage, designing engineer; James Munn, consulting engineer; E. A. Moritz, office engineer; A. McD. Brooks, purchasing agent; S. E. Hedden, disbursing officer; J. M. Luney, chief clerk.

FIELD OFFICES OF CHIEF COUNSEL.

Denver, Colo.—Law section, office of chief of construction: E. E. Roddis and Armand Offutt, district counsel; J. J. Buck, assistant district counsel. Office of irrigation district organization: E. W. Burr, district counsel. Office of land titles: E. H. Peery, district counsel.

El Paso, Tex.—P. W. Dent, district counsel; H. D. Padgett, assistant district counsel; C. F. Harvey, clerk. Projects: Rio Grande, Carlsbad, and Hondo.

Los Angeles, Cal.—O. P. Morton, district counsel; T. F. Fly, assistant district counsel; R. M. Patrick, assistant district counsel, located at Fallon, Nev. Projects: Salt River, Yuma, Orland, and Truckee-Carson.

Portland, Oreg.—H. L. Holgate, district counsel; L. L. Langley, R. J. Coffey, and J. T. Hinkle, assistant district counsel. Projects: Yakima, Okanogan, Umatilla, and Klamath.

Boise, Idaho.—B. E. Stoutemyer, district counsel. Projects: Boise, Minidoka, King Hill, and Jackson Lake Enlargement.

Helena, Mont.—W. J. Egleston, district counsel. Projects: Blackfeet, Flathead, Fort Peck, Huntley, Milk River, St. Mary Storage, Sun River, North Dakota Pumping, Lower Yellowstone, and Shoshone.

Scottsbluff, Nebr.—A. R. Honnold, district counsel. Projects: North Platte, Pathfinder Dam, and Belle Fourche.

Montrose, Colo.—J. R. Alexander, district counsel; A. G. Pollock, assistant district counsel, located at Provo, Utah. Projects: Grand Valley, Uncompahgre Valley, and Strawberry Valley.

PROJECT ORGANIZATION.

Salt River Project.—Being operated by the Salt River Valley. Water Users' Association. W. R. Elliott, project manager, Phoenix, Ariz.

Yuma Project.—W. W. Schlecht, project manager, Yuma, Ariz.; R. M. Priest, superintendent of construction; Frank Pettee, chief clerk; E. M. Philebaum, fiscal agent.

Orland Project.—A. N. Burch, project manager, Orland, Cal.; E. T. Eriksen, engineer; C. H. Lillinston, chief clerk and fiscal agent.

Grand Valley Project.—S. O. Harper, project manager, Grand Junction, Colo.; J. S. Martin, chief clerk; J. A. Schaetzel, fiscal agent.

Uncompahgre Valley Project.—F. D. Pyle, project manager, Montrose, Colo.; A. H. Peach, chief clerk; C. B. Funk, fiscal agent.

Boise Project.—D. W. Cole, senior engineer, Boise, Idaho, C. C. Fisher, engineer; E. R. Mills, chief clerk; C. F. Weinkauf, fiscal agent.

King Hill Project.—Walter Ward, project manager, King Hill; Idaho; R. B. Smith, chief clerk; R. H. Slaughter fiscal agent.

Minidoka Project.—Barry Dibble, project manager, Burley, Idaho; F. A. Banks, engineer, Dudley Pringle, chief clerk; Miss A. J. Larson; fiscal agent.

Huntley Project.—R. H. Fifield, project manager, Huntley, Mont.; G. H. Bolt, chief clerk and fiscal agent.

Milk River Project.—G. E. Stratton, project manager, Malta, Mont.; E. R. Scheppelmann, chief clerk; J. T. M. Culbertson, fiscal agent.

St. Mary Storage Unit.—R. M. Snell, project manager, Browning, Mont.; L. V. Branch, engineer, Sherburne, Mont.; Frank Nivens, chief clerk; L. H. Kline, fiscal agent, Browning, Mont.

Sun River Project.—A. H. Ayers, project manager, Fort Shaw, Mont.; H. W. Johnson, chief clerk; Miss Ruth Lundin, fiscal agent.

Lower Yellowstone Project.—L. H. Mitchell, project manager, Savage, Mont.; J. C. Doubt, chief clerk and fiscal agent.

North Platte Project.—Andrew Weiss, project manager, Mitchell, Nebr.; H. W. Bashore, engineer, Fort Laramie Unit; Paul Roth, irrigation manager; H. D. Comstock, office and drainage engineer; J. R. Ummel, chief clerk; O. K. Barnes and E. Z. Christeson, fiscal agents.

Truckee-Carson Project.—J. F. Richardson, project manager, Fallon, Nev.; G. B. Snow, chief clerk and fiscal agent.

Carlsbad Project.—L. E. Foster, project manager, Carlsbad, N. Mex.; V. L. Minter, chief clerk and fiscal agent.

Rio Grande Project.—L. M. Lawson, project manager, El Paso, Tex.; J. L. Burkholder, engineer; C. A. Peavey, chief clerk; L. S. Kennicott, fiscal agent.

North Dakota Pumping Project.—W. S. Arthur, project manager and chief clerk, Williston, N. Dak.

Umatilla Project.—H. M. Schilling, project manager, Hermiston, Oreg.; M. D. Scroggs, superintendent of irrigation; C. H. Young, chief clerk and fiscal agent.

Klamath Project.—J. B. Bond, project manager, Klamath Falls, Oreg.; C. C. Hogue, chief clerk; E. V. Hillius, fiscal agent.

Belle Fourche Project.—B. E. Hayden, project manager, Newell, S. Dak.; J. C. Counter, irrigation manager; R. C. Walber, chief clerk; August Lewin, fiscal agent.

Strawberry Valley Project.—J. L. Lytel, project manager, Provo, Utah; G. H. Murphy, chief clerk; J. E. Overlade, fiscal agent.

Okanogan Project.—Calvin Casteel, project manager, Okanogan, Wash.; H. A. Yates, chief clerk and fiscal agent.

Yakima Project.—R. K. Tiffany, project manager, Yakima, Wash.; C. E. Crownover and G. C. Finley, engineers; R. K. Cunnigham, chief clerk; J. C. Gawler, fiscal agent; L. G. Maney, logging superintendent in charge of construction at Meadow Creek, Wash.; W. D. Funk, principal clerk and fiscal agent at Meadow Creek, Wash.; J. G. Heinz, assistant engineer, Sunnyside, Wash.; J. S. Moore, superintendent of irrigation, Naches, Wash.

Shoshone Project.—G. O. Sanford, project manager, Powell, Wyo.; C. M. Jump, superintendent of irrigation; C. A. Denman, chief clerk; H. L. Bowers and R. L. Morgenweck, fiscal agents.

Indian Projects:

Blackfeet Project.—R. M. Snell, project manager, Browning, Mont.; Frank Nivens, chief clerk; L. H. Kline, fiscal agent.

Flathead Project.—F. T. Crowe, project manager, St. Ignatius, Mont.; H. N. Bickel, chief clerk; J. P. Siebeneicher and G. H. Baird, fiscal agents.

Fort Peck Project.—R. M. Conner, project manager, Poplar, Mont.; Henry Berryhill, chief clerk and fiscal agent.

Riverton Project.—H. D. Comstock, engineer in charge, Riverton, Wyo.; R. R. Wright, chief clerk and fiscal agent.

DISTRIBUTION OF EMPLOYEES.

Employees, June, 1918.

Office or project.	Educational.	Non-educational.	Others.	Total, United States.	Contractors.	Grand total.
Washington office	78		12	90		90
Denver office	64	1		65		65
Field offices, district counsel	38			38		38
Billings office	1			1		1
Kansas City office	1			1		1
Arizona, Salt River.[1]						
Arizona-California, Yuma	10	168	181	359		359
California, Orland	6	9	6	21		21
Colorado:						
Grand Valley	9	34	59	102		102
Uncompahgre Valley	12	49	45	106		106
Idaho:						
Boise	25	82	71	178		178
King Hill	13	8	7	28		28
Minidoka	22	75	104	201		201
Montana:						
Huntley	5	17	67	89	1	90
Milk River distribution unit	9	24	28	61	12	73
St. Mary storage unit	10	17	73	100		100
Sun River	12	43	137	192		192
Montana-North Dakota, Lower Yellowstone	4	7	18	29		29
Nebraska-Wyoming, North Platte	24	152	484	660	160	820
Nevada, Truckee-Carson	14	56	90	160		160
New Mexico, Carlsbad	5	14	44	63	12	75
New Mexico-Texas, Rio Grande	24	101	719	844	60	904
North Dakota, North Dakota pumping	2	5	15	22		22
Oregon, Umatilla	8	15	21	44	4	48
Oregon-California, Klamath	7	30	42	79		79
South Dakota, Belle Fourche	5	33	30	68		68
Utah, Strawberry Valley	8	30	146	184	27	211
Washington:						
Okanogan	3	14	8	25		25
Yakima—						
Project office	14		1	15		15
Storage unit	14	139	378	531		531
Sunnyside unit	4	34	51	89		89
Tieton unit	1	17	25	43		43
Wyoming, Shoshone	12	65	210	287	25	312
Indian projects, Montana:						
Blackfeet	1	5	15	21		21
Flathead	37	52	300	389		389
Fort Peck	5	5	93	103		103
Total, June, 1918	507	1,301	3,480	5,288	301	5,589

[1] Operation and maintenance of project transferred to water users, Nov. 1, 1917.

WAGES.

Approximate average daily wages, common labor, 1914–1918.

State and project.	1914		1915		1916		1917		1918	Increase in 4 years.
	June.	Dec.	June.	Dec.	June.	Dec.	June.	Dec.	June.	
Arizona: Salt River	$2.00	$1.75	$1.90	$1.90	$2.15	$2.15	$2.25	$2.60	$3.00[1]	$1.00
Arizona-California: Yuma	2.00	2.00	2.00	2.00	2.00	2.20	2.40	2.75	3.00	1.00
California: Orland	2.50	2.50	2.40	2.50	2.50	2.75	2.75	2.75	3.25	.75
Colorado:										
Grand Valley	2.25	2.40	2.31	2.50	2.50	2.50	2.65	3.00	3.00	.75
Uncompahgre Valley	2.12	2.25	2.61	2.50	2.50	2.50	2.50	3.25	3.25	1.13
Idaho:										
Boise—										
Distribution unit	2.30	2.40	2.50	2.25	2.40	2.40	2.40	3.00	3.30	1.00
Storage unit	2.50	2.50	2.50	2.50	2.50	2.50	2.75	......	......	....
Minidoka: Distribution unit	2.25	2.25	2.25	2.25	2.25	2.25	3.00	3.50	3.50	1.25
Idaho-Wyoming: Storage unit (Jackson Lake)	2.50	2.50	2.50	2.50	2.50	2.50	2.75	......	......	....
Montana:										
Huntley	2.50	2.50	2.24	2.45	2.25	2.75	2.75	3.30	3.30	.80
Milk River: Distribution unit	2.50	2.65	2.60	2.70	2.80	2.80	3.00	3.20	3.30	.80
St. Mary storage unit	2.50	2.50	2.40	2.56	2.50	2.72	2.86	3.00	3.60	1.10
Sun River	2.25	2.24	2.18	2.40	2.50	2.72	3.00	3.25	3.58	1.33
Montana-North Dakota: Lower Yellowstone	2.25	2.35	2.25	2.40	2.25	2.75	2.75	3.00	3.00	.75
Nebraska-Wyoming:										
North Platte—										
Interstate unit	2.12	2.35	2.40	2.40	2.40	2.40	2.50	2.88	3.20	1.08
Fort Laramie unit	......	......	......	2.00	2.30	2.40	2.50	3.04	3.20	1.20
Nevada: Truckee-Carson	2.20	2.50	2.50	2.50	2.50	2.50	2.75	3.50	3.75	1.55
New Mexico: Carlsbad	1.50	1.50	1.50	1.63	1.63	1.76	1.76	2.00	2.00	.50
New Mexico-Texas:										
Rio Grande—										
Distribution unit	1.25	1.25	1.50	1.50	1.58	1.50	1.75	1.75	1.75	.50
Elephant Butte storage	1.67	1.67	1.67	1.70	1.72	......	......	......	......	....
North Dakota: North Dakota pumping	2.50	2.50	2.50	2.50	2.50	2.50	2.75	2.75	2.87	.37
Oregon: Umatilla	2.40	2.40	2.40	2.40	2.40	2.50	2.80	3.00	3.50	1.10
Oregon-California: Klamath	2.48	2.48	2.48	2.48	2.50	2.50	2.72	3.30	3.50	1.02
South Dakota: Belle Fourche	2.24	2.24	2.50	2.50	2.52	3.00	2.80	3.00	3.25	1.01
Utah: Strawberry Valley	2.50	2.50	2.50	2.25	2.37	2.60	2.80	3.00	3.25	.75
Washington:										
Okanogan	2.50	2.50	2.20	2.20	2.20	2.60	2.80	3.00	3.20	.70
Yakima—										
Storage unit	2.20	2.20	2.60	2.20	2.60	2.80	3.00	2.90	3.00	.80
Sunnyside unit	2.20	2.00	2.00	2.20	2.20	2.40	2.60	3.00	3.30	1.10
Tieton unit	2.00	2.20	2.20	2.20	2.40	2.60	2.75	3.00	3.30	1.30
Wyoming: Shoshone	2.40	2.40	2.40	2.40	2.40	2.75	2.93	3.34	3.50	1.10
Indian projects:										
Montana—										
Blackfeet	2.40	2.40	2.40	2.40	2.50	2.50	2.50	2.50	3.28	.88
Flathead	2.50	2.50	2.25	2.52	2.65	2.75	2.90	3.20	3.50	1.00
Fort Peck	2.50	2.50	2.50	2.56	2.50	2.70	2.80	3.15	3.30	.80

[1] Estimated.

NOTE—The average wages per day have increased from about $2 in June, 1914, to about $3 in June, 1918.

INJURIES.

Statement of injuries to employees of the United States Reclamation Service reported under the act of Sept. 7, 1916.

State and project.	Injuries reported.				Claims allowed.				Compensation paid.			
	[1] 1916	1917	[2] 1918	Total.	[1] 1916	1917	[2] 1918	Total.	[1] 1916	1917	[2] 1918	Total.
Arizona: Salt River	6	22	......	28	5	12	......	17	$893.90	$1,163.48	......	$2,057.38
Arizona-California: Yuma	11	35	22	68	8	16	5	29	383.57	2,224.76	$190.45	2,798.78
California: Orland	1	4	3	8	1	2	2	5	13.07	128.29	53.35	194.71
Colorado:												
Grand Valley	6	8	5	19	4	2	1	7	85.34	82.28	22.02	189.64
Uncompahgre	4	14	22	40	8	8	13	24	111.67	296.74	765.99	1,174.30
District of Columbia: District of Columbia	......	1	......	1	......	1	1	1	......	......	21.60	21.60
Idaho:												
Boise	21	23	11	55	14	12	4	30	1,478.56	871.55	141.52	2,491.63
King Hill	......	2	5	7	......	......	3	3	......	......	60.67	60.67
Minidoka	2	6	5	13	2	1	......	3	194.45	6.00	......	200.45
Montana:												
Huntley	3	8	5	16	3	2	......	5	57.83	227.57	......	285.40
Milk River	1	6	8	15	1	2	2	5	32.00	62.65	196.30	290.95
St Mary storage	2	10	......	12	1	7	......	8	35.47	235.67	......	271.14
Sun River	......	10	2	12	......	6	1	7	......	181.70	8.33	190.03
Lower Yellowstone	......	3	1	4	......	......	......	......	......	......	......	......
Nebraska-Wyoming: North Platte	3	8	12	23	2	5	1	8	57.07	400.90	33.34	491.31
Nevada: Truckee-Carson	6	7	9	22	1	2	2	5	14.93	136.44	91.11	242.48
New Mexico: Carlsbad	3	5	......	8	2	3	......	5	39.56	31.31	......	70.87
New Mexico-Texas: Rio Grande	1	19	42	62	......	10	6	16	......	238.55	383.81	622.36
North Dakota: North Dakota pumping	3	5	2	10	2	1	1	4	44.29	582.25	86.71	713.25
Oregon: Umatilla	3	2	......	5	1	1	......	2	76.00	57.87	......	133.87
Oregon-California: Klamath	2	5	3	10	1	5	2	8	62.83	387.30	119.07	569.20
South Dakota: Bellefourche	4	3	2	9	3	1	1	5	298.89	100.01	11.11	410.01
Utah: Strawberry Valley	1	2	1	4	1	1	1	3	29.87	28.89	11.00	69.76
Washington:												
Okanogan	......	1	......	1	......	......	......	......	......	......	......	......
Yakima	8	68	40	116	7	45	17	69	248.54	2,485.45	453.29	3,187.28
Wyoming: Shoshone	1	16	......	17	1	5	......	6	4.44	1,202.32	......	1,206.76
INDIAN PROJECTS.												
Montana:												
Blackfeet	......	3	......	3	......	1	......	1	......	6.67	......	6.67
Flathead	7	44	3	54	7	24	......	31	272.66	2,477.37	......	2,750.03
Fort Peck	......	1	......	1	......	......	......	......	......	......	......	......
Total	99	341	203	643	70	174	63	307	4,434.94	13,616.02	2,649.57	20,700.53

[1] Sept. 7 to Dec. 31.

[2] To June 30.

ENGINEERING ARTICLES RELATING TO THE WORK OF THE SERVICE.

The following is a partial list of engineering articles relating to the work of the Reclamation Service as published in engineering and technical journals. The list is printed for the information of engineers and others interested in the work, and is a continuation of the list printed on pages 557 to 573 of the sixteenth annual report. Lists 1, 2, and 3, printed in separate form are available for free distribution.

GENERAL ARTICLES.

Editorial praise of engineering organization of United States Reclamation Service (short). Eng. News, Jan. 30, 1908, vol. 59, p. 125.

Swamp and overflowed land drainage in the Mississippi Basin. F. W. Hanna, Eng. News, Feb. 13, 1908, vol. 59, pp. 168–169.

Completion of projects, 1908, Table of per cent. Eng. News, Feb. 18, 1908, vol. 61, p. 197.

The telephone standards of the United States Reclamation Service (long extracts of specifications). Eng. Record, Mar. 14, 1908, vol. 57, p. 301.

Detailed cost of various works (editorial on, including interest, depreciation and preparatory expenses). Eng. Record, Apr. 25, 1908, vol. 57, p. 543.

Brig. Gen. Wm. L. Marshall appointed Chief of Engineers, United States Army (long account of life). Eng. News, July 9, 1908, vol. 60, p. 48.

Tijdschrift Van Het Koninklijk Instituut van Ingenieurs, afdeeling Nederlandsch-Indie, 1909–1910, Inhoud: "Het Irrigatiewezen in het Western der Verreenigde Staten van Noord-Amerika." (U. S. Reclamation Service projects described.) Door, P. J. Ott de Vries, Ingenieur, B. O. W. Batavia, Javasche Boekhandel & Drukkerij, 1910. 103 pages and 32 folding maps and plans.

Resolutions endorsing F. H. Newell and A. P. Davis. Pa. Soc. of Engrs. Eng. Record, June 11, 1910, vol. 61, p. 51 (of the supp.).

Comments on irrigation congress (Salt Lake City). Western Engineering, Dec. 1912, vol. 1, pp. 700–704.

Investigation of the Reclamation Service. Remarks by Secretary Lane at opening of conference of water users, May 1, 1913. F. K. Lane, Western Engineering, June, 1913, vol. 2, pp. 480–481.

Principles of Irrigation Engineering. Review of book of F. H. Newell and D. W. Murphy, Western Engineering, Sept. 1913, vol. 3, p. 231.

Systematic aid to settlers is first need. Address by Elwood Mead at Governor's Conference, Denver. Irrigation Age, May,1914, vol. 30, pp. 202–204 and 216.

State aid for settlers on irrigation developments. Address by Elwood Mead at Denver Irri. Conference, Apr. 9, 1914, Eng. Record, June 13, 1914, vol. 69, pp. 668–669.

Report of Committee of Am. Soc. C. E., F. H. Newell, chairman, on a National water law. Western Engineering, Feb. 1916, vol. 7, p. 59.

Earth roads on sand soils. Andrew P. Anderson in Feb. 1916, Reclamation Record. Western Engineering, Apr. 1916, vol. 7, pp. 135–136.

Construction and maintenance of gravel roads (from Reclamation Record). Andrew P. Anderson, Western Engineering, May, 1916, vol. 7, pp. 181–182.

A complete method for the classification of irrigable lands (Canada). F. H. Peters, Proc. Amer. Soc. C. E., Sept. 1916, p. 1231; discussion of same by T. Kennard Thomson, Proc. Amer. Soc. C. E., Nov. 1916, vol. 42, p. 1549.

$9,530,000 irrigation project planned in California (Pine Flats project on Kings River, Cal.) L. C. Hill, consulting engineer, Eng. Record, Dec. 30, 1916, vol. 74, p. 813.

Summary of construction results to Dec. 31, 1916. Western Engineering, Apr. 1917, vol. 8, p. 125.

Effect of alkali soil on cement tile and on concrete blocks. E. C. Bebb (review of Bureau of Standards Bull. No. 95 in the March, 1917, Reclamation Record). Western Engineering, Apr. 1917, vol. 8, p. 131.

E. H. Baldwin resigns as senior engineer. News items, Eng. News-Record, May 10, 1917, vol. 78, p. 334.

California reservoirs silt up slowly. Illus. J. B. Lippincott, Eng. News-Record, July 26, 1917, vol. 79, pp. 169–170.

Standards Bureau to test cement for Reclamation Service. A. P. Davis, Eng. News-Record, July 26, 1917, vol. 79, p. 188.

Secretary of the Interior lets irrigation contract. Eng. News-Record, Aug. 2, 1917, vol. 79, p. 236.

Reclamation of arid lands. Eng. News-Record, Aug. 16, 1917, vol. 79, p. 334.

Masonry dams notably treated. Review by F. Teichman. Eng. News-Record, Sept. 20, 1917, vol. 79, p. 562.

Engineering achievements. Illus. C. J. Blanchard. Article in Manual and Register of National League of Government Employees for 1917, pp. 141-151. (Illus. of Arrowrock, Roosevelt and Shoshone dams). 276 pages in volume.

Tribute to Newlands as friend of engineers. F. H. Newell, Eng. News-Record, Jan. 3, 1918, vol, 80, p. 53.

Objects of the Am. Asso. of Engrs. Report by Messrs. Randolph, Finley, and Newell, Eng. & Cont., Jan. 9, 1918, vol. 49, p. 47–48.

Land reclamation offers a wide engineering field. F. H. Newell, Eng. News-Record, Jan. 17, 1918, vol. 80, p. 119.

Effect of alkali soils upon the durability of cement and concrete blocks. (Review of Bull. No. 95, Bureau of Standards) Western Engineering, Feb. 1918, vol. 9, p. 77.

Engineers want reclamation fund for Oklahoma. Eng. News-Record, Feb. 7, 1918. vol. 80, p. 281.

Durability of cement drain tile and concrete in alkali soils (long review, with conclusions, of Tec. Paper No. 95 of Bureau of Standards). Eng. & Cont., Feb. 13, 1918, vol. 49, pp. 170–172 (inclu. exp. of Shoshone, Yuma, Sun River, Sunnyside, Grand Valley, and Uncompahgre Projects).

New edition of "Hydraulic and Excavation tables" (short review). Eng. & Cont., Feb. 20, 1918, vol. 49, p. 191.

Wages of common labor have risen 20 per cent since war began. Short editorial, p. 185; tabulation of wages all projects 1914–1917, $2.23 to $2.63; page 193, Eng. & Contracting, Feb. 20, 1918, vol. 49.

Expenditures on U. S. R. S. projects (June 30, 1917) amount to $123,000,000 (tabulation by functional features for all projects). Eng. & Cont., Feb. 20, 1918, vol. 49, p. 194.

Preliminary work on great federal irrigation program needed now. Eng. News-Record, Feb. 28, 1918, vol. 80, p. 392.

Engineering work and food supply. Address by F. H. Newell, Am. Soc. of Agricultural Engineers, Eng. & Cont., Mar. 13, 1918, vol. 49, pp. 263–264.

Kansas pumps underground water for irrigation (with costs). J. B. Marcellus, Eng. News-Record, Mar. 21, 1918, vol. 80, p. 570.

Reclaiming the arid West. (The story of the U. S. R. S.) Illus. 411 pp. Geo. Wharton James. Review by editor, Eng. News-Record Mar. 21, 1918, vol. 80, pp. 571–572.

Why some irrigation canals and reservoirs leak. Illus. A. P. Davis, Eng. News-Record, Apr. 4, 1918, vol. 80, pp. 663–665.

Hydraulic and excavation tables of U. S. R. S. Review of 4th edition. Eng. News-Record, Apr. 18, 1918, vol. 80, p. 781.

What it is to be an American, illus. Franklin K. Lane, National Geographic Magazine, Apr., 1918, vol. 33, pp. 348–354.

New Democracy seen by Franklin K. Lane (address at Chicago Convention, Chamber of Commerce of United States). Eng. News-Record, Apr. 18, 1918, vol. 80, pp. 751–752.

An engineering council now almost forgotten. F. H. Newell, Eng. News-Record, Apr. 25, 1918, vol. 80, pp. 806–808.

Vast scheme of land reclamation proposed by Secretary Lane. Eng. & Cont., June 19, 1918, vol. 49, p. 612–613.

To reclaim land for returning soldiers. (Editorial on Secretary Lane's policy.) Eng. News-Record, June 20, 1918, vol. 80, p. 1161.

Sydney B. Williamson commissioned Lieut. Col. 55th R. R. Cons. Engrs. (brief account of life). Eng. News-Record, July 25, 1918, vol. 81, p. 201.

Am. Soc. C. E., Development Committee first step to important development in society's activity, says A. P. Davis, Eng. News-Record, Aug. 1, 1918, vol. 81, pp. 240–241.

Results of the irrigation work of the U. S. Reclamation Service. Municipal and County Engineering, Aug., 1918, vol. 55, p. 75.

Publications of the U. S. Reclamation Service. (Review of price list of publications.) Cut-over Lands, Aug., 1918, vol. 1, No. 5, p. 29.

State aid and direction in land settlement. Elwood Mead, Cut-over Lands (series of articles), June, July, Aug., 1918, vol. 1, Nos. 3, 4, and 5.

Land reclamation would provide work and homes for hosts of veterans (with tables of areas of swamp and cut-over timber lands). A. P. Davis, Eng. News-Record, Aug. 22, 1918, vol. 81, pp. 361–364. (Editorial notice, p. 343.)

Providing homes for returning soldiers. Plan of Secretary F. K. Lane, Electrical Review, Sept. 14, 1918, vol. 73, p. 415.

Land reclamation and reconstruction. (Editorial on policy of U. S. R. S.) Eng. News-Record, Oct. 3, 1918, vol. 81, p. 609.

More engineers study cut-over lands and drainage. (Long news article, with list of engineers.) Eng. News-Record, Oct. 3, 1918, vol. 81, p. 645.

Reclaiming the Desert. (Twenty small views and six photogravures of Roosevelt and Arrowrock Dams and Gunnison Tunnel.) C. J. Blanchard, The Mentor, Oct. 15, 1918, No. 165, 12 pp. and 6 inset views. The Mentor Association, 114–116 East 16th St., New York.

Acres and a mule for veterans. (Editorial of Sec. Lane's land for soldiers plans.) World's Work, Nov., 1918, vol. 37, p. 18.

Farms for the soldiers when they come back, illus. Elwood Mead, World's Work, Nov., 1918, vol. 37, pp. 61–67.

ARIZONA, SALT RIVER PROJECT.

Roosevelt Dam built high enough to be safe against floods. Eng. News, Feb. 6, 1908, vol. 59, p. 154.

Cost of excavating hardpan on the Grand Canal, 20 cents per cubic yard. Eng. Record, May 2, 1908, vol. 57, p. 593.

Cost of rubble concrete, Granite Reef Dam. Eng. Record, June 27, 1908, vol. 57, p. 811.

Cement manufacturing costs at Roosevelt Dam (short news item from Reclamation Record). Eng. Record, June 27, 1908, vol. 57, p. 806.

Illustration of Roosevelt Dam cement mill in advertisement of Allis-Chalmers Co. Milwaukee. Eng. Record, Aug. 12, 1911, adv. p. 53.

Hitting the Glory Trail in an automobile, illus. Gerald Mygatt, Outlook, Feb. 28, 1917, vol. , pp. 365–368.

Condition of fish in irrigation canals. (Fish killed at Roosevelt Spillway and at Colorado River.) Commerce Reports, May 21, 1917, No. 118, p. 674.

W. R. Elliott appointed project manager, Salt River Valley Water Users' Association. Eng. News-Record, Dec. 20, 1917, vol. 79, p. 1178.

Water users get Salt River reclamation project. Walter Ward, Eng. News-Record, Dec. 27, 1917, vol. 79, p. 1220.

Electricity in the Salt River Valley, illus. Harry A. Welsh, Jour. of Elec., May 15, 1918, vol. 40, p. 496 (frontispiece, p. 492).

ARIZONA-CALIFORNIA, YUMA PROJECT.

Laguna weir about completed (short news article). Eng. Record, Jan. 30, 1909, vol. 59, p. 138.

Flood discharges (162,000 second-feet) at Yuma, Ariz. Western Engineering, June, 1916, vol. 7, p. 226.

Harriman and the Colorado River break. The Salton Sea, W. W. Schlecht. Review. Eng. News-Record, Aug. 16, 1917, vol. 79, p. 325.

Surveys for an All-American Imperial canal. W. W. Schlecht, Eng. News-Record, Sept. 6, 1917, vol. 79, p. 475.

All-American canal for Imperial Valley. J. F. Richardson, Eng. News-Record, Nov. 29, 1917, vol. 79, p. 1010.

To connect Imperial Valley canal system with Laguna Dam. W. W. Schlecht, Eng. News-Record, Dec. 20, 1917, vol. 79, p. 1176.

Estimating the cost of the proposed Imperial-Laguna Dam connection. C. K. Clarke, Eng. News-Record, Jan. 24, 1918, vol. 80, p. 188.

Construction to be rushed on San Diego & Arizona Railway. Eng. News-Record, Mar. 7, 1918, vol. 80, p. 482.

Tentative Imperial Valley-Laguna Dam contract drawn (news item). Eng. News-Record, May 9, 1918, vol. 80, p. 928.

All-American canal for Imperial Valley (short prelim. report). Eng. News-Record, July 25, 1918, vol. 81, pp. 196–197.

CALIFORNIA, ORLAND PROJECT.

Submarine saw removes weeds in streams and lakes, illus. R. C. E. Weber, Eng. News-Record, Feb. 14, 1918, vol. 80, pp. 305–306.

Orland irrigation project is 62 per cent settled (with chart). Eng. News-Record, May 16, 1918, vol. 80, p. 956.

Canal over divide raises storage service factor (East Park Feed Canal), illus. Eng. News-Record, June 20, 1918, vol. 80, pp. 1186–1189.

COLORADO, GRAND VALLEY PROJECT.

Operation of Grand River roller dam proves satisfactory, illus. S. O. Harper, Eng. News-Record, June 27, 1918, vol. 80, pp. 1225–1226.

COLORADO, UNCOMPAHGRE VALLEY PROJECT.

Resume lining Gunnison Tunnel. F. D. Pyle, Eng. News-Record, Oct. 18, 1917, vol. 79, p. 764.

Operation and management of an irrigation project. Fred D. Pyle. (From Irrigation Age.) Western Engineering, Dec., 1917, vol. 8, p. 474.

IDAHO, BOISE PROJECT.

Canalization of the Columbia and Snake Rivers. John H. Lewis, Western Engineering, Nov., 1913, vol. 3, pp. 364–368.

Arrowrock Reservoir cost nearly $5,000,000 (from August Reclamation Record). D. W. Cole, Eng. News-Record, Sept. 30, 1917, vol. 79, p. 535.

A comparison of the Elephant Butte and Arrowrock Dams. Jos. E. Sater, Concrete, Dec., 1917, vol. 11, p. 183 (from Reclamation Record).

Methods of stopping leaks in irrigation canals, Boise project (short article). Eng. & Cont., Feb. 13, 1918, vol. 49, p. 169.

Cost of drag-line excavator operation on drainage construction, Boise project. Eng. & Cont., Feb. 20, 1918, vol. 49, p. 200.

Safety for two great dams, illus. (abstract of article by Jos. E. Sater in Oct., 1917, Reclamation Record). Mine and Quarry, July, 1918, vol. 10, pp. 1066–1067.

Why some irrigation canals and reservoirs leak. A. P. Davis, Eng. News-Record, Apr. 4, 1918, vol. 80, pp. 663–665.

IDAHO, MINIDOKA PROJECT.

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